PB82-157785

Final Environmental Impact Statement and Report North Monterey County Facilities Plan. Volume I

Monterey Peninsula Water Pollution Control
Agency, CA

Prepared for

Environmental Protection Agency
San Francisco, CA

Aug 77

U.S. Department of Commerce
National Technical Information Service
NTIS

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P.O. Box 190
Monterey, CA 93940

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Region IX
San Francisco, CA 94111

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Technical Assistance by Jones and Stokes Associates in association with Gruen, Gruen & Associates, Ann S. Peak & Associates, Dr. Joel Hedgpeth and Mr. Dwight Baier

16. Abstract (Limit: 200 words)

The North Monterey County Wastewater Facilities Plan will provide additional waste treatment capacity at a consolidated regional facility to handle the reasonable growth in the North Monterey County area. The project will be constructed in three elements.

This document contains the revisions and additions to the Draft EIS/EIR (as well as the entire Draft EIS/EIR). These are based on the comments received and further information developed on the project. Major issues Raised by Comments are: Water quality issues centered on stream flow augmentation to the Salinas River, the public health agencies' comments firmly cautioned against reusing effluent for irrigation until its health effects are adequately studied and air quality comments were supportive of the EIS' impact analysis and stress the mitigation of the projects secondary air quality impact.

17. Document Analysis a. Descriptors

Regional Planning
Sewerage
Treatment Facilities
Water Reuse
Ocean Disposal
Sewage Disposal

b. Identifiers/Open-Ended Terms

Salinas River
Salinas Lagoon
Monterey County CA
Environmental Impact Statement
Irrigation Water
Construction Grants
Secondary Effects

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report)

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See Instructions on Reverse

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PB82-157785

Final Environmental Impact Statement and Report North Monterey County Facilities Plan

VOL. I

August 1977

U.S. Environmental Protection Agency
Monterey Peninsula Water Pollution Control Agency

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

FINAL

ENVIRONMENTAL IMPACT STATEMENT
AND
ENVIRONMENTAL IMPACT REPORT

NORTH MONTEREY COUNTY FACILITIES PLAN

AUGUST 1977

Volume I

PREPARED BY

MONTEREY PENINSULA WATER POLLUTION CONTROL AGENCY
P. O. Box 190
Monterey, California 93940

and

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION IX
100 California Street
San Francisco, California 94111

With Technical Assistance by

JONES & STOKES ASSOCIATES, INC.
2321 P Street
Sacramento, California 95816

444 2638

In Association with

Gruen Gruen + Associates
Don Owen & Associates
Ann S. Peak & Associates
Dr. Joel Hedgpeth
Mr. Dwight Baier

GRANT NO. C-06-1066

RESPONSIBLE OFFICIALS:

for Paul DeFalco, Jr.
Regional Administrator
Environmental Protection Agency
Region IX

Dudley N. Lapham

Dudley Lapham, Manager
Monterey Peninsula Water
Pollution Control Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
100 CALIFORNIA STREET
SAN FRANCISCO, CALIFORNIA 94111

August 22, 1977

TO ALL INTERESTED AGENCIES, PUBLIC GROUPS, AND CONCERNED INDIVIDUALS:

The final Environmental Impact Statement (EIS) and the Environmental Impact Report (EIR) for the North Monterey County Wastewater Facilities Plan is being distributed at this time for your review and comment. This program will provide additional waste treatment capacity at a consolidated regional facility to handle the reasonable growth in the North Monterey County area. The project will be constructed in three elements. The first element will be the interceptor pipelines connecting the existing treatment facilities and an ocean outfall; the second element will be the regional treatment facility; and the third element will be the implementation of the reclamation option. The third element depends upon the results of the current reclamation demonstration project (for agricultural irrigation). The final EIS/EIR has been prepared to conform with the requirements of the National Environmental Policy Act of 1969 and the California Environmental Quality Act of 1970.

Comments should be sent to this Office (Attn: HE-135) within thirty (30) days of the date of this letter. After thirty days, and after review of any comments received, EPA may make a grant offer for design of the proposed project.

The final EIS/EIR may be reviewed at:

U.S. Environmental Protection Agency, Region IX
Library
100 California Street
San Francisco CA 94111

U.S. Environmental Protection Agency
Public Reference Unit (PM-213)
401 M. Street, S.W., Room 2922
Washington D.C. 20460

County Public Library
26 Central Avenue
Salinas CA 93901

East Salinas Branch Library
1207 East Market Street
Salinas CA 93901

El Gabilan Branch Library
1400 North Main Street
Salinas CA 93901

Hartnell College Library
156 Homestead Avenue
Salinas CA 93901

John Steinbeck Library
110 West San Luis Street
Salinas CA 93901

Castroville Branch Library
Preston and McDougall Street
Castroville CA 95012

Marina Branch Library
371 Carmel Avenue
Marina CA 93933

Monterey Peninsula College Library
980 Fremont
Monterey CA 93940

Monterey Library
Madison and Pacific
Monterey CA 93940

Pacific Grove Library
Central and Fountain Avenue
Pacific Grove CA 93950

Please bring this notice to the attention of all persons who would be interested in this matter.

Sincerely,

L OConnell
for Paul De Falco, Jr.
Regional Administrator

East Salinas Branch Library
1207 East Market Street
Salinas CA 93901

El Gabilan Branch Library
1400 North Main Street
Salinas CA 93901

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Pacific Grove Library
Central and Fountain Avenue
Pacific Grove CA 93950

Please bring this notice to the attention of all persons who would be interested in this matter.

Sincerely,

O'Connell
for Paul De Falco, Jr.
Regional Administrator

RESOLUTION NO. 77-4

A RESOLUTION OF THE MONTEREY PENINSULA WATER POLLUTION CONTROL AGENCY ACCEPTING AND CERTIFYING THE NORTH MONTEREY COUNTY FACILITIES PLAN FINAL EIR/EIS, DESIGNATING A CERTAIN ALTERNATIVE IN SAID PLAN, AND DECLARING CERTAIN POLICY AND MITIGATION MEASURES

-oOo-

WHEREAS, this Agency, pursuant to the California Environmental Quality Act (Public Resources Code §§21000 et seq.) and the National Environmental Policy Act (42 U.S.C. §§4321 et seq.), has directed the preparation and filing of an EIR/EIS with regard to the North Monterey County Facilities Plan, the Agency's regional wastewater project (No. C-06-1066); has noticed and held the required public hearings regarding same; and has received and carefully considered the Final EIR/EIS document;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Monterey Peninsula Water Pollution Control Agency, as follows:

1. The Agency does hereby reiterate its selection of Alternate No. 166 in the said Facilities Plan as the designated regional project of this Agency.

2. The Board of Directors does hereby declare that in the implementation of said alternate No. 166 it shall be the Agency policy to give primary emphasis to the reclamation and reuse of treated effluent to the greatest extent feasible.

3. The Agency hereby determines and declares that the basic mitigation measure the Agency will pursue in addressing the potential secondary air quality impact of the regional system will be in the design and sizing of the initial regional treatment plant to accommodate the Department of Finance E-O population criteria or formula for the service area, presuming, how-

ever, that sizing, dimensions and capacity of the balance of the system (i.e., interceptors, pumping stations, outfall, etc.) will remain as stipulated in the Facilities Plan.

4. The Agency further determines and declares that in responding to expressed secondary impact concerns over reduction of the Salinas River flow as endangered by the regional system elimination of the Salinas municipal treatment plants, the Agency mitigation commitment will be an independent study of resultant effects in the lower Salinas River in the reach between Salinas and the Lagoon. The specific scope of such study shall be determined and authorized by the Agency prior to its conduct.

5. The Agency hereby declares and confirms its intent that normal mitigation of primary impacts (such as construction disruptions) from implementation of the Plan will be pursued to the Agency's fullest ability to unilaterally address same.

6. Based upon the above declarations, determinations and stipulations, the Agency does hereby accept, adopt and certify said Final EIR/EIS.

PASSED AND ADOPTED at a regular meeting of the Monterey Peninsula Water Pollution Control Agency duly held on August 11, 1977, by the following vote:

AYES: BOARD MEMBERS:

NOES: BOARD MEMBERS:

ABSENT: BOARD MEMBERS:

Michal Moore, Chairman

Attest: [illegible], Manager

PREAMBLE

On April 8, 1977, the U.S. Environmental Protection Agency, Region IX, and the Monterey Peninsula Water Pollution Control Agency (a joint powers agency) jointly issued a Draft Environmental Impact Report (according to the California Environmental Quality Act of 1970) and Draft Enviromental Impact Statement (according to the National Environmental Policy Act of 1969) on the North Monterey County Facilities Plan. The EIS/EIR was filed with the State Clearinghouse (SCH No. 77042516) and with the Council On Enviromental Quality (ELR No. 70499) and circulated for review among various Federal, State, and local agencies, as well as firms, organizations and concerned individuals.

[This document contains the]

Contained herein are revisions and additions to the Draft EIS/EIR (as well as the entire Draft EIS/EIR). These are based on the comments received at the public hearing, written comments, and further information developed on the project. This document (with Volume II - appendices) constitutes the final EIS/EIR in accordance with CEQ Guidelines 40 CFR 1500, EPA Regulations 40 CFR 6, and California Administrative Code Regulations, Title 14, Division 6.

MAJOR ISSUES RAISED BY COMMENTS are

- Comments concerning water quality issues centered on stream flow augmentation to the Salinas River during low flow periods and impacts on the Salinas River Lagoon.

- Many favorable comments were received supporting reclamation/reuse of treated wastewater for crop irrigation and landscape irrigation. The public health agencies comments firmly cautioned against reusing this effluent for irrigation until its health effects are adequately studied, and

- Air quality comments were supportive of the EIS' impact analysis and stress the mitigation of the projects secondary air quality impact. Several comments questioned the project's design capacity.

- The necessity for Ford Ord's participation in the regional system was questioned by the Army.

- The Marina County Water District seriously questioned the cost effectiveness of abandoning their recently upgraded plant to tie in to the regional system.

- A number of additional alternatives were indicated and suggested for consideration. This included the Office of Appropriate Technology's on-site systems, land treatment, and continued use of the reclamation study's pilot tertiary treatment plant.

- The financial impacts of Ford Ord's non-involvement, E-0 funding, and the Castroville Irrigation Project's (CIP) non-existence were requested.

RECOMMENDATION

As discussed in the Draft EIS/EIR, the proposed project will eliminate near shore discharges to Monterey Bay, will upgrade the level of treatment to meet the Federal secondary treatment standard, and will utilize reclamation/reuse to the greatest extent feasible. The primary impacts of project construction and operation will be reduced to minor levels except for energy consumption. The principal secondary impacts of the proposed project are decreased air quality, conversion of prime agricultural land to residential acreage, and elimination of a sustained habitat in the Salinas River between Salinas and the Lagoon during dry weather.

While proposed mitigation measures will reduce the severity of the impacts, the impacts remain. EPA expects the mitigation measures will be carried out in good faith as certified in the Monterey Peninsula Water Pollution Control Agency's resolution.

EPA finds, in conclusion, that the proposed project is environmentally sound, and proposed to offer grant assistance in the amount of 75% of eligible project costs as determined by the State of California.

INTRODUCTION

This document has been prepared in compliance with the mandates of the National Environmental Policy Act of 1969 (NEPA) and the California Environmental Quality Act of 1970 (CEQA). Final Environmental Impact Statements (EIS) and Environmental Impact Reports (EIR) are required by federal and state guidelines in order to respond to substantive comments on the draft document and to indicate disposition of significant environmental issues identified in draft preparation and review.

The North Monterey County Facilities Plan has been developed to remedy existing water quality problems created by discharge of domestic wastewater into the surface waters of the lower Salinas Valley and southern Monterey Bay. It is also designed to bring the eight existing wastewater treatment plants in the project study area into compliance with the legal requirements of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) and the California Porter-Cologne Act. The existing wastewater discharges are creating undesirable water quality and public health conditions in the coastal waters of southern Monterey Bay, the lower Salinas River, and the Tembladero Slough-Elkhorn Slough estuarine system.

In order to remedy these problems, the Monterey Peninsula Water Pollution Control Agency (MPWPCA) proposes to design, construct and operate a regional wastewater treatment facility to accommodate the combined flows of the Cities of Monterey, Pacific Grove, Salinas, Seaside, Marina, Del Rey Oaks, and Sand City; the unincorporated Community of Castroville; and the Fort Ord Military Reservation. The project will be constructed in three separate stages. Stage I includes construction of interceptors from the Monterey Peninsula, Castroville and Salinas to a common point south of the Salinas River; and construction of an ocean outfall to central Monterey Bay. Existing wastewater treatment plants would be maintained and contribute treated effluent to the interceptors. A regional secondary treatment plant would be constructed at the terminus of the interceptors south of the Salinas River in Stage II. This would allow closure of the eight existing plants; raw sewage would be pumped to the new plant. Stage III would involve construction of tertiary treatment facilities at the regional plant site and delivery of treated effluent to farmland in the lower Salinas Valley for irrigation reuse. The third stage is contingent upon the outcome of an ongoing agricultural irrigation demonstration project at Castroville.

This Final EIS/EIR is composed of two separate volumes. Volume I contains a summary of the Final EIS/EIR, the complete and unrevised text of the Draft EIS/EIR as issued in April 1977, an unrevised addendum to the Draft, copies of all letters of comment on the Draft, the full transcript of the public hearing on the Draft, written responses to all substantive comments, suggested changes to the text of the Draft, and appended material compiled in preparing the Final. It is important to note that pages 1 to 395 of this volume are unrevised Draft EIS/EIR material and an addendum to the Draft. The pages both preceding and following this section include materials developed for the Final and were prepared subsequent to public review of the Draft. Volume II includes the complete and unrevised appendices to the Draft EIS/EIR as issued in April 1977. Any changes in the Draft Appendices required as a result of public comment are included in the Revisions to the Text of the Draft EIS/EIR section of Volume I. All appendix material developed subsequent to issuance of the Draft is also included in Volume I.

SUMMARY OF FINAL EIS/EIR

SUMMARY

Environmental Impact Statement
and
Environmental Impact Report

Draft ( )

Final (X)

Prepared Jointly By:

Monterey Peninsula Water Pollution Control Agency
P. O. Box 190
Monterey, CA 93940

U. S. Environmental Protection Agency
Region IX
100 California Street
San Francisco, CA 94111

Type of Action:

Administrative

Dates Made Available to CEQ and Public:

Draft -- April 22, 1977

Final -- August 22, 1977

General Project Description

Alternative Projects Analyzed in the Draft EIS/EIR

Five major project alternatives and "no action" were given a thorough environmental analysis in the Draft EIS/EIR. Each of the alternatives (except no action) proposed consolidation of wastewater flows from eight northern Monterey County wastewater treatment facilities and transport to a single regional treatment plant near the mouth of the Salinas River. Major interceptor routes and treatment plant locations were common to each alternative. The alternatives varied in their level of treatment and means of wastewater disposal/reuse. The five alternatives are summarized below:

> Alternative 1 - Secondary treatment (level 1A treatment, Table K-1 of Volume II) with year-round discharge through an outfall to central Monterey Bay.
>
> Alternative 134 - Tertiary treatment (level IV treatment, Table K-1) and conveyance to the Castroville area for irrigation reuse from approximately April to October and discharge to the lower Salinas River or lagoon (level III or V) for the remainder of the year.
>
> Alternative 166 - Tertiary treatment (level IV) and conveyance to the Castroville area for irrigation reuse from approximately April to October and discharge of secondary effluent through an outfall to central Monterey Bay (level 1A) for the remainder of the year.
>
> Alternative 170 - Tertiary treatment (level IV) and conveyance to the Castroville area for irrigation reuse from approximately April to October and storage in a 900-acre reservoir for eventual irrigation reuse the remainder of the year.
>
> Alternative 171 - Secondary treatment with filtration (level II) and year-round discharge to 185 acres of percolation ponds for additional treatment and subsurface storage; repumping and conveyance to the Castroville area for irrigation reuse from approximately April to October.

Apparent Best Alternative

The facilities planning process in North Monterey County has resulted in identification of an apparent best alternative for solving the area's existing water quality problems. This project, Alternative 166, was recommended by the facilities engineers in their Facilities Plan For North Monterey County, Interim Report No. 3, Draft Facilities Plan Report (Engineering Science, Inc., 1976a). The environmental analysis of the project alternatives, as detailed in the Draft Environmental Impact Statement and Report - North Monterey County Facilities Plan (U.S. Environmental Protection Agency, 1977) indicated that two of the five alternatives (134 and 166) were worthy of consideration for eventual implementation. Subsequent to receiving public testimony on the Draft EIS/EIR (in both written form and through oral testimony at public hearings held May 18 and 19, 1977), a decision was made by the MPWPCA with the concurrence of EPA and the SWRCB to proceed on design of Alternative 166. A brief description of this project and its time frame for implementation is presented below.

Facilities. The proposed regional wastewater system is composed of three major interceptors, a single regional treatment plant and an ocean outfall to central Monterey Bay. Irrigation reuse of the treated effluent is planned as part of the system, but implementation of this element of the project will be held in abeyance pending the outcome of a five-year agricultural irrigation demonstration project.

Interceptors. The three major interceptors will originate from the existing Monterey, Salinas and Castroville County Sanitation District treatment plants. In the initial stage of the project, all will carry treated effluent from the existing treatment plants to the ocean outfall south of the Salinas River. The Monterey interceptor will carry the combined wastes of the existing Pacific Grove, Monterey, Seaside County Sanitation District, Fort Ord and Marina County Water District treatment systems. The Castroville interceptor will transport the Castroville CSD flows and the Salinas interceptor will transport flows from both existing City of Salinas plants. Once the regional treatment plant is constructed, all interceptors will carry untreated effluent.

The Monterey interceptor will be designed to accommodate the peak wet-weather flows from the ultimate population in the Monterey Peninsula area. The Castroville and Salinas interceptors will be designed to carry peak wet-weather flows from the year 2000 population. The design criteria are listed in the following table.

Treatment Plant. The regional wastewater treatment plant will be designed to accommodate an average dry-weather flow of approximately 22 mgd. This sizing has been mandated by EPA as a mitigation for the deterioration of regional air quality likely to occur if service area populations increase as currently anticipated by local planning agencies. Treatment plant design criteria are presented in the following table.

The regional plant is to be located south of the Salinas River on land currently owned by the Monterey Peninsula Garbage and Refuse Disposal District. It will be constructed as a second stage of overall project implementation and will initially provide secondary treatment (level 1-A in Table K-1 of Volume II) for discharge to the ocean. If agricultural irrigation is proven feasible by an ongoing demonstration project, treatment processes producing tertiary effluent (level IV, Table K-1) will be added to the plant as a third stage of overall project implementation. The reclaimed effluent would be used to irrigate food crops in the Castroville area from April to October; the remainder of the year effluent would be discharged to the ocean via the new outfall.

Ocean Outfall. The proposed ocean outfall will be constructed in the initial stage of project implementation. Current design indicates the off-shore portion of the outfall will have a total length of 1,950 meters (6,400 feet), will terminate on the ocean bottom at a depth of 22 meters (75 feet), and will have a peak wet-weather flow design capacity of 82 mgd. The outfall will cross the beach line approximately one mile south of the mouth of the Salinas River and will extend west-southwest at an angle of 105° from true North. The multi-port diffuser at the end of the outfall will be 950 meters long.

Population Base and Service Area. The population base used to size the wastewater facilities varies between the interceptors and treatment plant. As stated above, the treatment plant is designed to accommodate the SWRCB's E-0 population projection for 1990. The Monterey interceptor is designed for the ultimate population predicted by local planning agencies, while the Salinas and Castroville interceptors are designed for year 2000 local projections. These projections are listed by AMBAG planning area in a following table. All calculations were based on the potential service area indicated in Figure 2, opposite page 4 of this report.

TREATMENT PLANT AND INTERCEPTOR DESIGN CRITERIA

	Design Average Dry-Weather Flow, mgd	Design Peak Wet-Weather Flow, mgd	Design Population[2]	GPCD Multipliers[3]
Treatment Plant	22[1]		223,900	70-110
Interceptors				
Monterey	15.24	41.86	169,000	70-110
Salinas	13.07	27.34	132,600	90-100
Castroville	1.56	3.55	18,800	75-100

1. Design flows for the treatment plant are estimated; new design criteria based on E-0 sizing limit are not completed.
2. Treatment plant sized to 1990 E-0 projection; Monterey interceptor designed to ultimate population; Salinas and Castroville interceptors designed to year 2000 populations.
3. For breakdown by AMBAG planning area, see Table 57 in Vol. 1 appendix.
   GPCD is gallons per capita per day.

FACILITIES POPULATION BASE

Planning Area	Planning Area Number[4]	Population Used to Size Interceptors	Population Used to Size Treatment Plant[3]
Castroville	32	12,500[1]	8,800
Castroville CSD	33	5,900[1]	
San Juan	38	4,100[1]	96,100
Salinas South	37	200[1]	
Gabilan	39	200[1]	
Salinas	40	113,500[1]	
Toro	41	15,000[1]	
Marina	34	22,000[2]	14,000
Fort Ord	35	25,000[2]	20,000
Monterey-Salinas	36	23,000[2]	85,000
Seaside CSD	42	42,000[2]	
Monterey	43	34,500[2]	
Pacific Grove	44	22,500[2]	
TOTAL		320,400	223,900

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[1] Local year 2000 projections reported in Engineering Science, Inc., 1976c.

[2] Local ultimate projections reported in Engineering Science, Inc., 1976c.

[3] SWRCB E-0 projections for 1990.

[4] AMBAG planning areas shown on Figure 49 of Volume I Appendix.

The service area of the new regional sanitation district has not been specifically delineated to date. It is anticipated that it will initially include only existing wastewater service areas. These are delineated on Figure 2, opposite page 4 of this report. Future service area expansions will be determined primarily by local planning decisions on location of new developments and annexations of presently unincorporated areas. The potential expansion areas identified for planning purposes by Engineering Science, Inc., (Figure 2) were developed through consultation with local planning agencies and review of existing general plans. The boundaries are not final, they are only approximations used in planning for wastewater facilities.

Funding. The proposed project, as originally planned, was estimated to have a total construction cost of $64.7 million. This included interceptors, outfall and regional secondary treatment plant. Subsequent size reductions imposed on the treatment plant have altered costs, but new numbers have not yet been generated. Only the treatment plant cost will change. Table M-1 in Volume II lists details of original cost estimates. The project financing plan and revenue program prepared by Bartle Wells Associates (1976) escalated original project costs to 1980 dollars (original estimates done in 1976 dollars) and established a project cost of $71.4 million. This does not include the cost of tertiary facilities needed if reclamation proves feasible. Of the $71.4 million, the federal installation share was estimated to be $9.5 million, the federal-state grant portion $51.9 million, and the local share was the remaining $10 million. These numbers will be revised when treatment plant sizing is confirmed and new estimates can be generated.

It is anticipated that the local funding will be raised through sale of bonds. A bond election will be necessary before this sale can be authorized. The regional sanitation district will generate revenue through a system of user charges and hook-up fees. The original Bartle Wells Associates estimate of typical single-family dwelling unit user charges was $4.50 per month. This may be revised due to changes in treatment plant costs.

Project Time Frame. The State Water Resources Control Board has recently proposed an accelerated time frame for implementation of the North Monterey County Facilities Plan project. This time frame is summarized below. The steps referred to are the SWRCB 201 project grant steps (Step 1 - Planning, Step 2 - Design, Step 3 - Construction).

- Step 2 - September 1977
- Design interceptor and outfall
- Bond election - June 1978
- Start design for plant
- Step 3 - September 1978 for interceptor and outfall
- Construct interceptor and outfall
- Step 3 - September 1979 for plant
- Complete and use interceptor and outfall - September 1979
- Complete plant - September 1981

Environmental Issues and Their Current Status

Significant environmental issues that remained unresolved at the time the Draft EIS/EIR was published were discussed on pages 337-342 of the Draft document. Since publication of the Draft, several of these issues have been clarified or rendered less significant in light of decisions made by the project applicant, EPA and the SWRCB. A brief status report on each issue follows.

Irrigation of Food Crops with Reclaimed Wastewater

The feasibility of this proposed wastewater reuse is being analyzed through a 5-year agricultural demonstration project in the Castroville area. Irrigation reuse will become a part of the regional wastewater system only if the results of this study indicate there are no significant adverse effects associated with the irrigation. An environmental analysis will be completed and made available to the public at the project's conclusion.

Impact of the Proposed Ocean Discharge

Since publication of the Draft EIS/EIR, Engineering Science, Inc. has released an additional oceanographic investigations report with detailed biological, water quality and physical oceanographic data collected near the proposed outfall terminus from July of 1976 to March of 1977 (Engineering Sciences, Inc., 1977). This document should be consulted if detailed species lists, water quality statistics or current metering data are desired (it is available in the offices of EPA-San Francisco, SWRCB-Sacramento, Engineering Science, Inc.-Berkeley and MPWPCA-Monterey). Additional analysis of the outfall's impact on marine biota is presented in the Ocean Outfall section of Response to Comments on following pages. To date there is no indication that a significant impact will result from the discharge, but pre-discharge monitoring will continue so that changes created by the outfall can be identified if they occur.

Impact on the Salinas River Lagoon

Water quality and inflow data needed to completely assess the impacts of the project alternatives on the Salinas River Lagoon are still lacking. The scope of work for the EIS/EIR did not include extensive water quality sampling or flow monitoring in the river. The work has not been authorized subsequently for several reasons: 1) a lower river discharge is opposed by the Central Coastal Regional Water Quality Control Board, as it would be in opposition to recommendations in the area's Basin Plan; 2) a lower river discharge could create undesirable public health threats to recreationists along the river and on beaches adjacent to the river mouth; 3) the cost of implementing a river discharge alternative is considerably higher than an ocean discharge alternative due to treatment levels required; and 4) in case of treatment plant upsets or failure, ocean discharge of poorly-treated or untreated effluent would present fewer potential hazards to human health than a river discharge. These facts have been judged sufficient to discourage a detailed water quality analysis of the lagoon area as part of the 201 study. Therefore, the issue of Alternative 134 impacts on the Salinas River Lagoon have not been completely resolved prior to making a decision on the project.

Air Quality

The issues of potential air quality degradation and necessary mitigation raised in the Draft EIS/EIR have been resolved to a large degree by reducing the size of the regional wastewater treatment plant. The allowable size for the plant has been reduced to that capable of treating the flows from an E-0 projected population in 1990. In effect this cuts the fundable plant size from the original 26 mgd to the currently proposed 22 mgd. The size reduction limits maximum sewered population within the service area to a point that increased vehicle travel and point source air pollution should not cause ambient air quality standards to be exceeded in the basin with the project planning time frame (1980-1990) note this conclusion was reached using supplement 5 to AP 42). This plant size reduction is considered sufficient mitigation by EPA and the State Air Resources Board.

The Monterey area regional planning agency, AMBAG, is currently in the process of requesting an Air Quality Maintenance Area (AQMA) designation for the Monterey-Santa Cruz air basin. If the AQMA designation is made, an Air Quality Maintenance Plan (AQMP) will be required. The AQMP will identify and implement additional controls on emission of air pollutants within the basin.

Geohydrologic Investigation

The need for a geohydrologic investigation in the vicinity of the Marina landfill and the storage reservoirs of Alternative 170 and 171 is discussed in the Wastewater Storage section of Response to Comments on the Draft EIS/EIR. The investigation will not be conducted as a part of this study due to the selection of Alternative 166 as the best apparent alternative.

Mitigation of Impacts on Salinas River Biota

Pages 234-243 of the Draft EIS/EIR discuss potential impacts of the project on lower Salinas River biota. The major concern identified is the effect that removal of the existing Salinas wastewater outfalls will have on biota downstream in the Salinas River. A variety of potential mitigation measures have been proposed, all of which include streamflow augmentation during the river's low-flow periods. General cost estimates and feasibility analyses were prepared for each potential mitigation, but to date none has progressed beyond that stage toward implementation. Because the California Department of Fish and Game feels the impacts to wildlife and vegetation would be significant, the State Water Resources Control Board plans to make further consideration of potential mitigation measures a condition of Step II grant approval. In effect, this would require MPWPCA to prepare a supplemental report on the technical, economic and institutional feasibility of stream flow augmentation alternatives; in addition the report would address the impacts of the various alternatives. Preparation of this supplemental report and adoption of some form of mitigation would be done in cooperation with the California Department of Fish and Game; this study should not hinder progress on planning and design of the total regional project.

Reuse of Effluent for Marsh Enhancement

Use of secondarily-treated wastewater for marsh enhancement in the Salinas River Lagoon Wildlife Management Area was suggested as a potential beneficial reuse in the Draft EIS/EIR. To date, further discussion of this possibility has not occurred. Granting of concept approval and authorization to begin design of the proposed project will not preclude future implementation of this option. Discussions between MPWPCA, EPA, the project engineers and the California Department of Fish and Game will be conducted to consider marsh enhancement in greater detail.

Impacts and Mitigation Measures

Implementation of the proposed project could result in a variety of impacts to northern Monterey County's physical, economic and socio-cultural environment. These impacts are related to both construction and operation of the proposed new wastewater facilities. There is also the potential for stimulating secondary or indirect impacts on the area's environment by providing an improved public utility. Utility improvements characteristically accommodate populations in excess of existing wastewater systems. A variety of measures that are capable of reducing or eliminating the project's potential adverse impacts were suggested in the Draft EIS/EIR. Some have since been adopted as part of the project itself. The following summary list of impacts and mitigations indicates which mitigations are now planned as part of the project. The list also includes those agencies or entities that should or will implement the mitigation measure.

Impacts o Mitigation Measure(s)	Possible Implementing Entity(ies)
CONSTRUCTION IMPACTS	
1. Creation of local noise, dust and aerial emissions along interceptors and at plant site.	
o Source control of noise, air emissions, dust.	Construction contractor
2. Visual disruption at construction sites.	
o Avoid construction through scenic areas.	MPWPCA*
o Keep disturbed areas to a minimum, reseed.	Construction contractor
o Locate vehicle storage and corporation yards away from transportation corridors.	Construction contractor
3. Loss of vegetation and wildlife habitat to new facilities, loss of non-mobile wildlife species on construction sites.	
o Avoid, minimize removal of vegetation; keep disturbed areas as small as possible, reseed.	Construction contractor
o Avoid construction through critical wildlife habitat.	MPWPCA*
4. Loss of agricultural land to new facilities.	
o Select pipeline routes and treatment plant site outside agricultural areas.	MPWPCA*
5. Temporary sedimentation in lower Salinas River	
o Place interceptors on existing bridge crossings to avoid trenching in active stream bed.	MPWPCA*
6. Temporary sedimentation in ocean waters.	
o Place dredging spoil on approved dry-land disposal area rather than in ocean waters.	Construction contractor
OPERATIONAL IMPACTS	
1. Slow accumulation of certain trace elements in agricultural soils.	
2. Increased salt leaching requirements in some agricultural areas.	
3. Decrease in the quality of irrigation return flows in some agricultural areas.	
4. Creation of a potential public health hazard at point of effluent discharge reuse.	
o Conduct agricultural irrigation demonstration project to monitor effects of irrigation reuse.	MPWPCA*
o Design ocean outfall so that discharge complies with State Ocean Plan requirements.	MPWPCA*

Impacts o Mitigation Measure(s)	Possible Implementing Entity(ies)
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4. Creation of a potential public health hazard at point of effluent discharge reuse.	
o Conduct agricultural irrigation demonstration project to monitor effects of irrigation reuse.	MPWPCA*
o Design ocean outfall so that discharge complies with State Ocean Plan requirements.	MPWPCA*

Impacts o Mitigation Measure(s)	Possible Implementing Entity(ies)
OPERATIONAL IMPACTS (continued)	
5. Local increase in vector populations at wastewater storage/reuse areas.	
o Implement vector control program at reservoirs through local mosquito abatement districts.	MPWPCA*, NSVMAD
o Design storage ponds with at least 2:1 slopes; control vegetative growth on pond perimeters.	MPWPCA*
6. Increase in energy and chemicals required for wastewater collection, treatment and disposal.	
o Utilize those treatment processes with lowest chemical and energy requirements.	MPWPCA
o Select pipeline routes, treatment plant location with least pumping requirements.	MPWPCA
o Utilize digestor-generated methane for treatment plant energy source.	MPWPCA*
7. Increase in the volume of sewage sludge produced through wastewater treatment.	
o Utilize treatment processes that do not require chemical precipitation of sludge.	MPWPCA
o Dewater sludge prior to disposal.	MPWPCA*
8. Reduction in surface flows in the lower Salinas River with resultant impacts on riparian vegetation and wildlife.	
o Conduct feasibility analysis of potential mitigation measures in cooperation with California Department of Fish and Game.	MPWPCA*
o Investigate use of treated wastewater for habitat enhancement on Department of Fish and Game wildlife area at Salinas River Lagoon.	DFG, CDH, MPWPCA*, MCEHD
9. Increase in the cost of providing wastewater treatment service.	
o Implement least costly treatment and disposal alternative possible	MPWPCA
o Limit treatment facilities sizing to that level considered grant fundable by EPA and SWRCB.	MPWPCA*[2]
o Eliminate as much infiltration/inflow as possible.	MPWPCA*, local public works departments
o Initiate water conservation and wastewater flow reduction programs.	MPWPCA, SWRCB, RWQCB, local government, public at large
10. Possible groundwater contamination in the Marina landfill site from disposal of sludge.	
o Dewater sludge prior to landfilling.	MPWPCA*
o Utilize leachate recovery system at sludge-drying sites.	MPWPCA*
11. Introduction of new wastewater discharge to central Monterey Bay with subsequent impact on Bay biota.	
o Conduct pre- and post-discharge monitoring programs required by the SWRCB and RWQCB.	MPWPCA*
GROWTH-RELATED IMPACTS[3]	
1. Increased pressure on local water supplies.	
o Implement a wastewater reclamation alternative to augment local water supplies.	MPWPCA*

Mitigation Measure(s)	Possible Implementing Entity(ies)
GROWTH-RELATED IMPACTS[3] (continued)	
2. Conversion of open space and agricultural land to urban uses.	
o Encourage high-density development in newly urbanized areas.	Local planning agencies, city councils, MCBS
o Encourage infill rather than peripheral development or sprawl.	Local planning agencies, city councils, MCBS
o Utilize Williamson Act land protection.	Local planning agencies, city councils, MCBS, local landowners
o Modify general plans and zoning ordinances to protect recognized valuable resources.	Local planning agencies, city councils, MCBS
o Prohibit direct tie-ins to new regional interceptors, except in existing urban areas.	MPWPCA*
3. Increased pressure on public services and facilities (schools, fire and police protection, solid waste disposal, etc.).	
o Encourage high-density development in newly urbanized areas.	Local planning agencies, city councils, MCBS
o Encourage infill rather than peripheral development or sprawl.	Local planning agencies, city councils, MCBS
4. Increases in urban runoff and erosion, affecting water quality.	
o Coordinate facilities planning and design with ongoing 208 studies.	MPWPCA*, EPA, SWRCB, AMBAG
5. Increases in stationary sources and vehicle traffic with subsequent degradation of air quality.	
o Adopt more stringent vehicle emission standards.	EPA, ARB
o Adopt more stringent point source emission standards.	MBUAPCD
o Control development of new industrial sources of pollution through general plan and zoning amendments, changes in conditional use permit procedures.	Local planning agencies, city councils, MCBS
o Reduce overall vehicle travel by:	
1. Modifying general plans and zoning ordinances to encourage infill and reduce urban sprawl.	Local planning agencies, city councils, MCBS
2. Design new residential areas to facilitate bus service.	Local planning agencies, MPT
3. Improve local transit service, encourage car pooling.	Local government, MPT
4. Encourage new development planning that facilitates non-motorized travel.	Local planning agencies
o Designate air basin an Air Quality Maintenance Area and develop local Air Quality Maintenance Plan	MBUAPCD, SWRCB, EPA
6. Increase demands on local energy and natural resource supplies.	
o Modify general plans, zoning ordinances and building codes to protect recognized valuable resources, i.e., energy supplies, rare and endangered plants and wildlife, critical wildlife habitat, mineral supplies, etc.	Local planning agencies, city councils, MCBS

NOTES AND ABBREVIATIONS: See next page.

NOTES AND ABBREVIATIONS:

* Indicates a mitigation measure being incorporated into project planning and design by MPWPCA. These will be accomplished. Other mitigations should be implemented by identified agency/entity at the request of MPWPCA.

[1] A list of all abbreviations included in the Implementing Entities column is presented below.

[2] Only the regional treatment plant is being reduced in size; interceptors remain as designed for local growth projections.

[3] All growth-related impacts are being mitigated to some extent by a reduction in the size of the regional wastewater treatment plant; the plant will be sized to accommodate flows from the estimated 1990 E-0 population defined by the SWRCB rather than from the original facilities plan design population.

ARB	California Air Resources Board
CDH	California Department of Health
CID	Castroville Irrigation District
DFG	California Department of Fish and Game
EPA	U. S. Environmental Protection Agency
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MCBS	Monterey County Board of Supervisors
MCEHD	Monterey County Environmental Health Department
MCFCWCD	Monterey County Flood Control and Water Conservation District
MPT	Monterey Peninsula Transit
MPWPCA	Monterey Peninsula Water Pollution Control Agency
NSVMAD	Northern Salinas Valley Mosquito Abatement District
RWQCB	Central Coastal Regional Water Quality Control Board
SWRCB	California State Water Resources Control Board

Recommendations

Preparation of a Draft EIS/EIR and submittal of its findings to government agencies and public review has allowed EPA and the MPWPCA to develop firm recommendations for the future direction of the North Monterey County Facilities Plan. Planning and design should proceed on the Facilities Plan's recommended alternative, No. 166. This project includes construction of three major wastewater interceptors and a new ocean outfall to central Monterey Bay south of the Salinas River. A regional secondary treatment plant should be constructed on land now owned by the Monterey Peninsula Garbage and Refuse Disposal District at the Marina landfill site.

The facilities planning effort must continue to actively investigate means of reclaiming and reusing the wastewaters of the project service area. Wastewater reclamation is a key element in the regional plan and can play a major role in alleviating the serious water supply problems of the Monterey Peninsula and lower Salinas Valley. The recently initiated agricultural irrigation demonstration project at Castroville should be continued and completed as scheduled. If this study indicates irrigation of food crops with treated wastewater is technically feasible, economically justifiable and environmentally acceptable, the third stage of the facilities plan should be implemented. This includes construction of tertiary treatment facilities and a wastewater delivery line to agricultural land in the lower Salinas Valley.

In the interim, the ongoing golf course irrigation reuse study on the Monterey Peninsula should be continued. This study may indicate reclamation and reuse is feasible on a local scale; this would aid the Monterey Peninsula communities in their efforts to improve their water supply situation and should not preclude eventual irrigation reuse on a regional scale should it prove feasible. In the event agricultural irrigation does prove infeasible, other methods of reusing wastewater will be actively pursued.

In order to mitigate major adverse impacts of the project identified in the Draft EIS/EIR, it is recommended that the treatment plant be designed to accommodate flows from the SWRCB's projected E-0 1990 population level rather than the original facilities plan population estimate. This re-sizing of the treatment plant will reduce the possibility that growth within the proposed service area will cause national and state ambient air quality standards to be exceeded within the Monterey-Santa Cruz air basin during the project's 10-year design period. In addition, it is recommended that a study of potential mitigation measures be pursued to reduce the project's impacts on lower Salinas River vegetation and wildlife. The technical, economic and environmental feasibility of augmenting flows in the Salinas River below Salinas must be better defined so that an appropriate mitigation for loss of summer flows can be implemented. This study should be conducted in cooperation with the California Department of Fish and Game.

Sources of Comments

The following individuals, organizations and agencies presented written comments on the Draft EIS/EIR.

Federal Agencies

U. S. Army, Chief of Engineers - Washington, D.C.
U. S. Army Corps of Engineers - San Francisco
U. S. Army - Fort Ord Division of Facilities Engineering
U. S. Coast Guard
U. S. Department of Interior - San Francisco
U. S. Department of Agriculture - SCS
U. S. Environmental Protection Agency Headquarters
U. S. Department of Health, Education & Welfare
Federal Highway Administration
Federal Power Commission - San Francisco
Federal Power Commission - Washington, D.C.
Advisory Council on Historic Preservation

State Agencies

State Water Resources Control Board
California Air Resources Board
California Department of Fish and Game
California Department of Health

Regional, Local Agencies

Central Coastal Regional Water Quality Control Board
Central Coastal Regional CCZCC
AMBAG
Monterey County Department of Health
Monterey County Board of Supervisors
Monterey County Flood Control and Water Conservation District
City of Salinas

Organizations, Firms, Individuals

George S. Nolte & Associates
Sierra Club - Ventana Chapter
League of Women Voters - Salinas
Ms. Bobbie Harms
Mr. Douglas R. McLain, Ph.D.
Mr. O. C. Mathern

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REPORT SUMMARY

Purpose and Objectives of the Project

The North Monterey County Facilities Plan is designed to improve water quality by improving *wastewater** treatment service to residents in the southern Monterey Bay-lower Salinas Valley region of Monterey County, California. This includes residents in the Cities of Monterey, Salinas, Seaside, Marina, Pacific Grove, Sand City and Del Rey Oaks; the unincorporated communities of Castroville and Moss Landing; and the Ft. Ord Military Reservation. The major objective of the project is to eliminate public health hazards and water quality problems being caused by existing wastewater discharges to Monterey Bay, the Salinas River, Tembladero *Slough* and Elkhorn Slough. In addition, the plan seeks to supply the additional wastewater treatment capacity needed to accommodate anticipated growth in the area and at the same time supply treated wastewater for irrigation reuse in the Castroville area so that overdrafting of the *groundwater* table and related salt water intrusion problems can be curtailed.

The Facilities Plan Draft Environmental Impact Statement (*EIS*) is a required element of the Monterey County Water Pollution Control Agency (MPWPCA) application for project funding under the joint federal-state financed Clean Water Grant Program. This program is administered by the California State Water Resources Control Board (SWRCB), but requires approval of the United States Environmental Protection Agency (EPA). Under terms of this program, local facilities construction projects are eligible to receive up to 75 percent federal and 12½ percent state grants for the planning, design and construction of municipal wastewater treatment systems. The minimum local share of the cost is therefore 12½ percent. The EIS must identify the potential environmental impacts of implementing the proposed project and its viable alternatives so that environmental as well as social and economic costs can be included in a *cost effectiveness* analysis of the plan.

Project Environmental Setting

The project study area encompasses 332 square miles of northern Monterey County from Elkhorn Slough on the north to Mt. Toro in the Sierra de Salinas Mountains on the south; and from the Gabilan Range on the east to Monterey Bay on the west (see Figure 1). This includes the fertile lower Salinas Valley, the rolling dunelands of Ft. Ord, the hilly Castroville-Prunedale and Monterey-Salinas corridors and the coastal urban areas along southern Monterey Bay.

* Italicized words are defined in the Glossary.

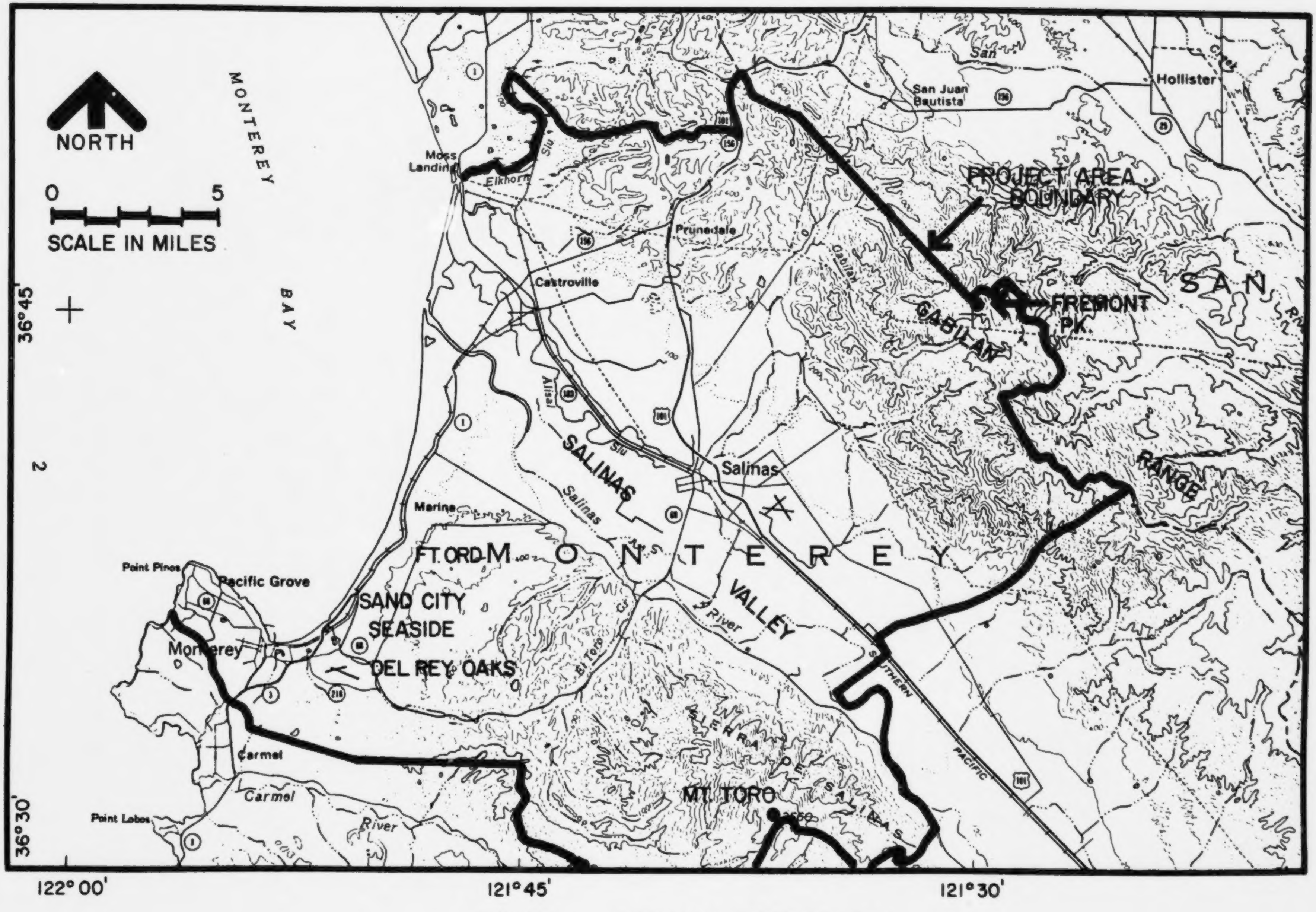

NORTH
0
5
SCALE IN MILES
MONTEREY
BAY
36°45
36°30
122°00'
121°45'
121°30'
Moss Landing
Elkhorn
Prunedale
Castroville
San Juan Bautista
San
Hollister
PROJECT AREA BOUNDARY
FREMONT PK.
GABILAN
Gabilan
SAN
RANGE
Alisal
SALINAS
Salinas
Salinas
Marina
FT. ORD
M O N T E R E Y
SAND CITY
SEASIDE
DEL REY OAKS
Point Pinos
Pacific Grove
Monterey
Carmel
Carmel
River
Point Lobos
El Toro
River
VALLEY
SOUTHERN
PACIFIC
SIERRA DE SALINAS
MT. TORO
2650

FIGURE 1 REGIONAL TOPOGRAPHY

Source: USGS 1:250,000 San Francisco Bay Region Map (7.5' series maps: Moss Landing, Prunedale, San Juan Bautista, Hollister, Mt. Harlan, Natividad, Chualar, Rana Creek, Spreckels, Seaside, Monterey, Marina, Salinas).

The principal land uses in the area are: agriculture and urban in the Salinas Valley; agriculture, grazing, rural residential and military in the rolling hills and dunelands between the valley and the coast; grazing and open space in the Gabilan Range foothills; and urban residential, commercial, recreation and military along the coast. There are small amounts of industry in the Salinas and Castroville-Moss Landing areas.

Agriculture and tourism are two of the major income-producers in the study area. Soils and climatic conditions make the lower Salinas Valley well suited to agricultural production. Monterey County as a whole accounts for slightly less than 3 percent of the state's harvested cropland, and slightly less than 3 percent of the state's total crop value. The majority of crops produced in the county are vegetables, sweet corn and melons, which historically account for about half the acreage in crops and about 18 percent of total California acreage in those crops; crops grown for grain account for another quarter of the acreage. Vegetable crops in the lower Salinas Valley, in order of diminishing value of production, are lettuce, celery, broccoli, cauliflower and artichokes. (Long-term trends in types of crops, irrigated acreage and value of crops are discussed on page of the EIS). These crops are grown on some of the richest agricultural land in either the state or the nation, and they supply a nationwide market. While agriculture dominates the economy of the lower Salinas Valley, tourism is critical to the Monterey Peninsula. Its unique and historic attractions make this area one of the most popular vacation spots on the California coast.

The major surface waters in the study area are Monterey Bay, the Salinas River, Old Salinas River and Moro Cojo, Tembladero and Elkhorn Sloughs. These waterways and the major agricultural drains that feed into them (Main Reclamation Ditch and Blanco Drain) experience frequent periods of poor water quality due to discharge of *domestic wastewater* and agricultural *irrigation return flows*. Hazardous conditions for water contact recreation and shellfish harvesting frequently occur on coastal beaches and in the Elkhorn Slough-Moss Landing Harbor area.

There are currently eight major domestic wastewater discharges to the area's surface waters (see Figure 2). Of these, three are to surface streams (two into the Salinas River and one into Tembladero Slough) and five are to southern Monterey Bay. The low summer flows in surface streams and sluggish circulation in the near-shore waters of southern Monterey Bay have intensified the problems associated with existing waste discharges. As a result of these conditions and waste treatment requirements included in the Federal Water Pollution Control Act Amendments of 1972 (FWPCA), existing discharges can no longer meet the Central Coastal Regional Water Quality Control Board (RWQCB) discharge requirements.

The California Department of Finance estimated that there were 166,819 people within the proposed project service area in 1975 (191,113 if Ft. Ord on-base housed personnel are included); by 1990 the local planning departments estimate the population will increase to 243,600 (263,600 with Ft. Ord). This population must be serviced by new wastewater facilities in order to remove the adverse water quality and public health conditions existing in surface waters today.

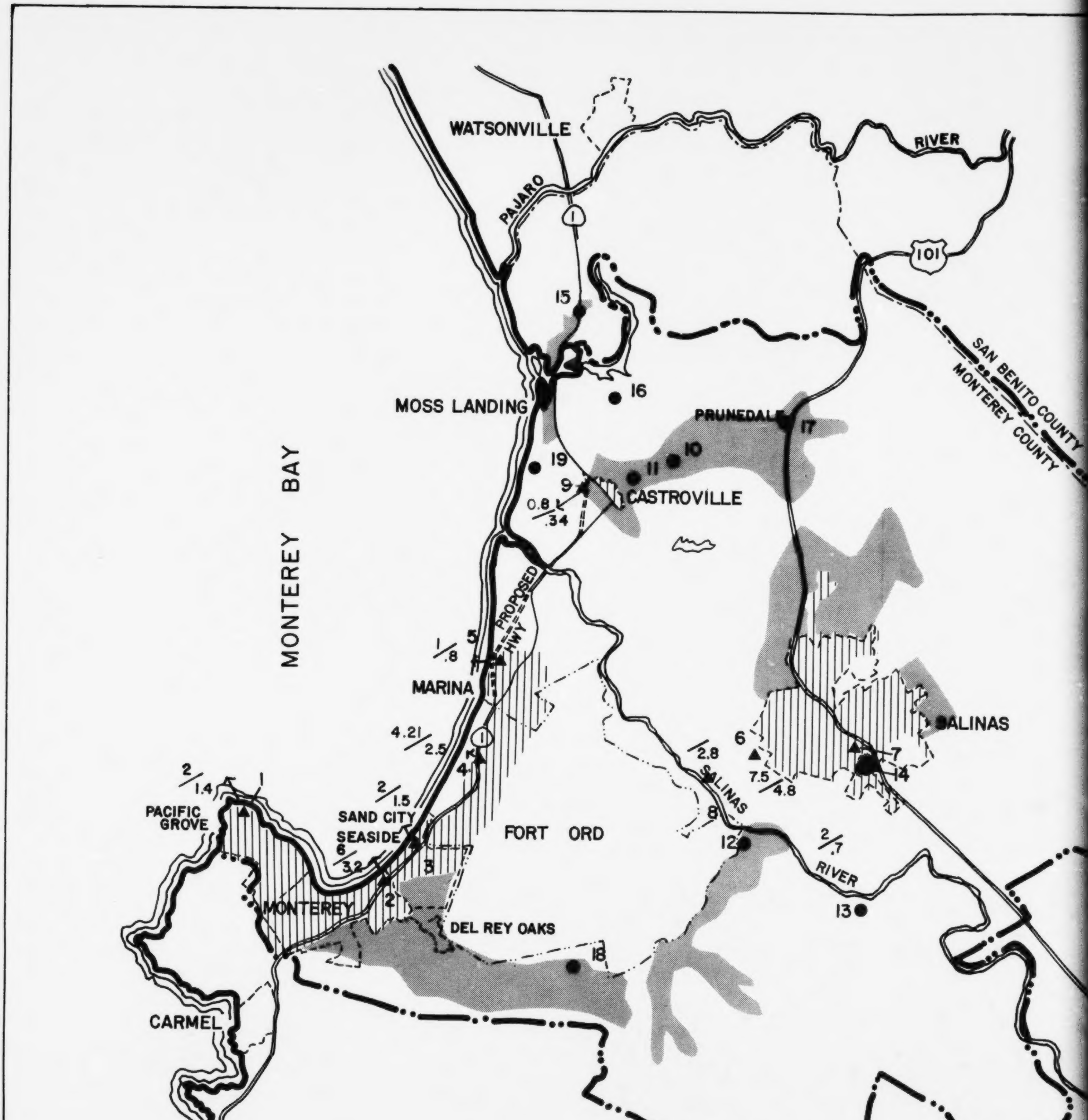
Legal, Regulatory and Institutional Constraints

Development of new wastewater facilities is affected by a variety of government agencies and their legal and regulatory mandates. Chief among these are pollution control mandates of the FWPCA and the California Porter-Cologne Act. The requirements of these acts are being implemented by the EPA and the SWRCB. In order to meet the requirements and receive federal-state funding for new facilities, MPWPCA must develop a plan that conforms to the objectives established in the Water Quality Control Plan - Central Coastal Basin. The major recommendations of this "Basin Plan" are elimination of south Monterey Bay waste discharges and regionalization of the area's waste treatment.

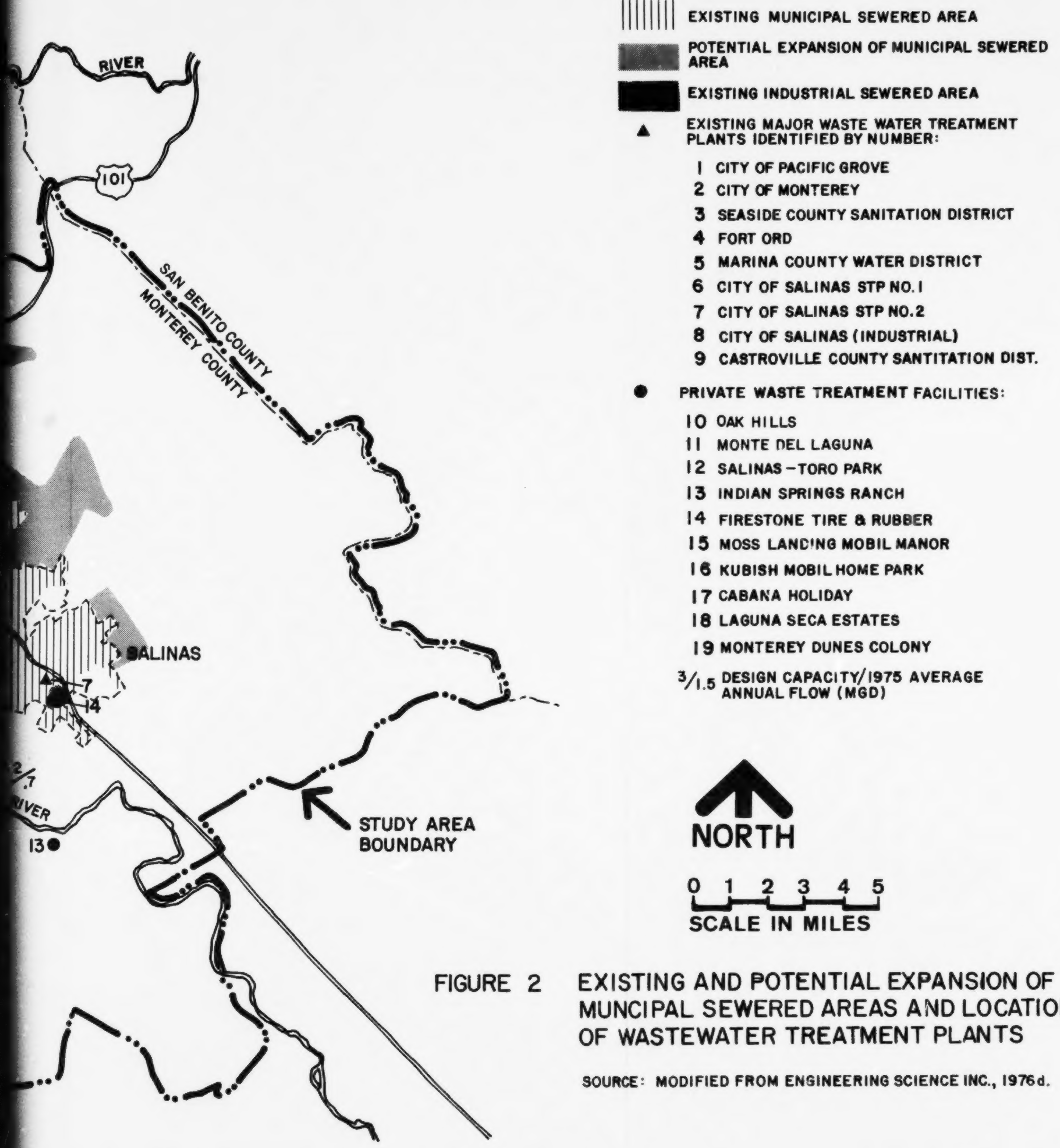
Waste discharge requirements issued by the RWQCB and the planning policies of Monterey County and the California Coastal Zone Conservation Commission are also major influences on development of the facilities plan.

Project Alternatives

Five major project alternatives (Figures 3, 4 and 5) and the required "no action" alternative are analyzed in detail in the EIS. The five alternatives were selected from an original list of 173 developed by Engineering Science, Inc., The Facilities Plan engineers. The alternatives reduction process included environmental, economic and engineering analyses of each plan; all assumptions used in the elimination process were presented for review and comment to the MPWPCA Technical Advisory Committee (TAC) which is composed of federal, state, regional and local government representatives and project consultants. The TAC was formed to guide the planning process



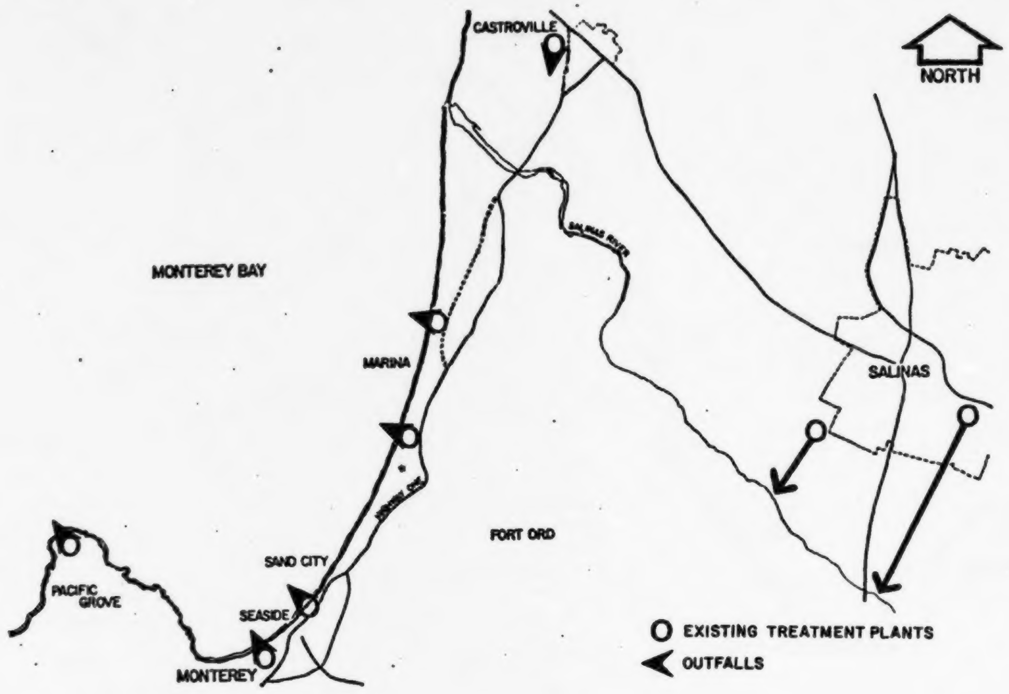
WATSONVILLE
PAJARO
RIVER
1
101
15
16
MOSS LANDING
PRUNEDALE
17
SAN BENITO COUNTY
MONTEREY COUNTY
MONTEREY BAY
19
11
10
9
CASTROVILLE
0.8
.34
PROPOSED HWY
1
.8
5
MARINA
4.21
2.5
1
4
2
1.4
1
PACIFIC GROVE
2
1.5
SAND CITY
SEASIDE
6
3.2
3
2
FORT ORD
MONTEREY
DEL REY OAKS
18
CARMEL
2.8
SALINAS
8
12
6
7.5
4.8
7
14
SALINAS
2
.1
RIVER
13



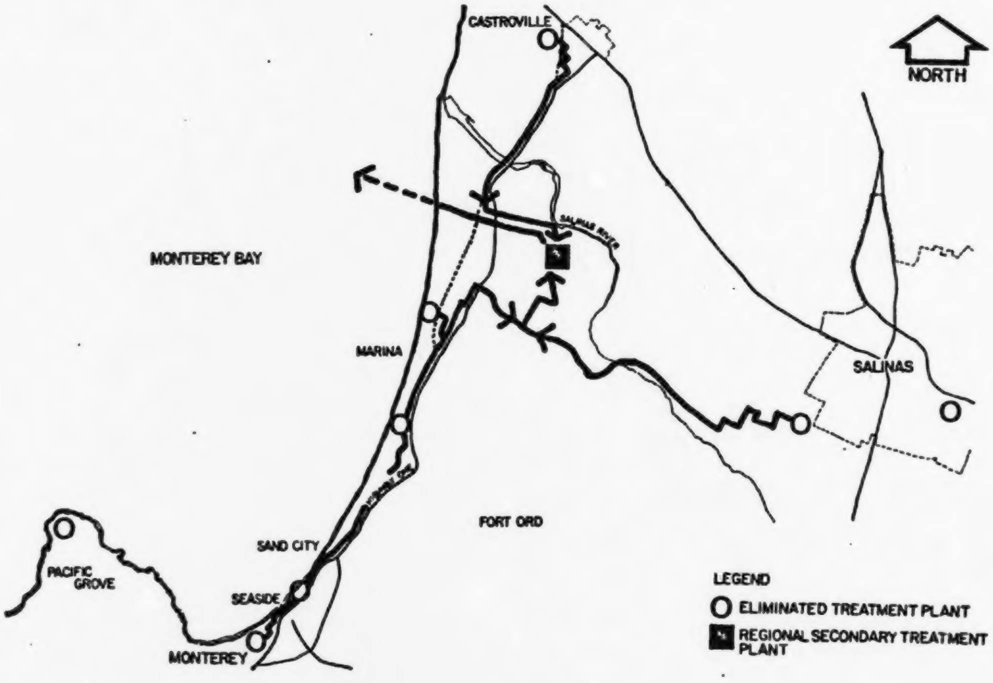
EXISTING MUNICIPAL SEWERED AREA
POTENTIAL EXPANSION OF MUNICIPAL SEWERED AREA
EXISTING INDUSTRIAL SEWERED AREA
▲ EXISTING MAJOR WASTE WATER TREATMENT PLANTS IDENTIFIED BY NUMBER:
1 CITY OF PACIFIC GROVE
2 CITY OF MONTEREY
3 SEASIDE COUNTY SANITATION DISTRICT
4 FORT ORD
5 MARINA COUNTY WATER DISTRICT
6 CITY OF SALINAS STP NO. 1
7 CITY OF SALINAS STP NO. 2
8 CITY OF SALINAS (INDUSTRIAL)
9 CASTROVILLE COUNTY SANTITATION DIST.
● PRIVATE WASTE TREATMENT FACILITIES:
10 OAK HILLS
11 MONTE DEL LAGUNA
12 SALINAS – TORO PARK
13 INDIAN SPRINGS RANCH
14 FIRESTONE TIRE & RUBBER
15 MOSS LANDING MOBIL MANOR
16 KUBISH MOBIL HOME PARK
17 CABANA HOLIDAY
18 LAGUNA SECA ESTATES
19 MONTEREY DUNES COLONY
3/1.5 DESIGN CAPACITY/1975 AVERAGE ANNUAL FLOW (MGD)
RIVER
101
SAN BENITO COUNTY
MONTEREY COUNTY
SALINAS
7
14
2/.7
RIVER
13
STUDY AREA BOUNDARY
NORTH
0 1 2 3 4 5
SCALE IN MILES

FIGURE 2 EXISTING AND POTENTIAL EXPANSION OF MUNCIPAL SEWERED AREAS AND LOCATION OF WASTEWATER TREATMENT PLANTS

SOURCE: MODIFIED FROM ENGINEERING SCIENCE INC., 1976d.


CASTROVILLE
NORTH
SALINAS RIVER
MONTEREY BAY
MARINA
SALINAS
FORT ORD
SAND CITY
PACIFIC GROVE
SEASIDE
MONTEREY
O EXISTING TREATMENT PLANTS
< OUTFALLS

EXISTING WASTEWATER SYSTEMS


CASTROVILLE
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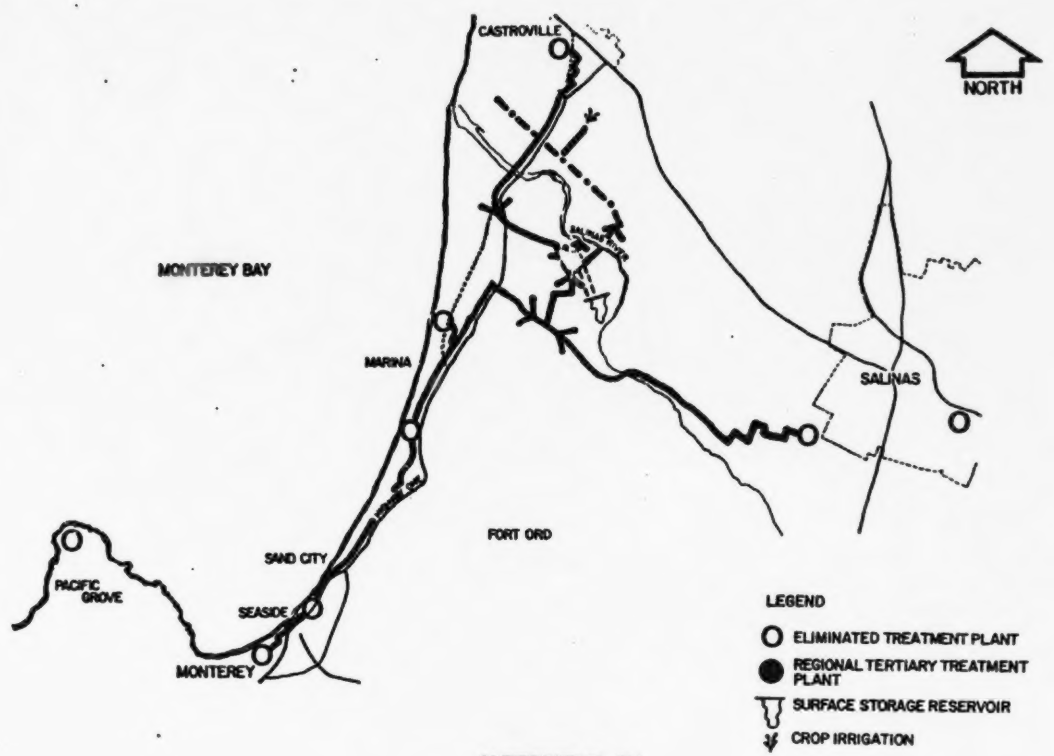
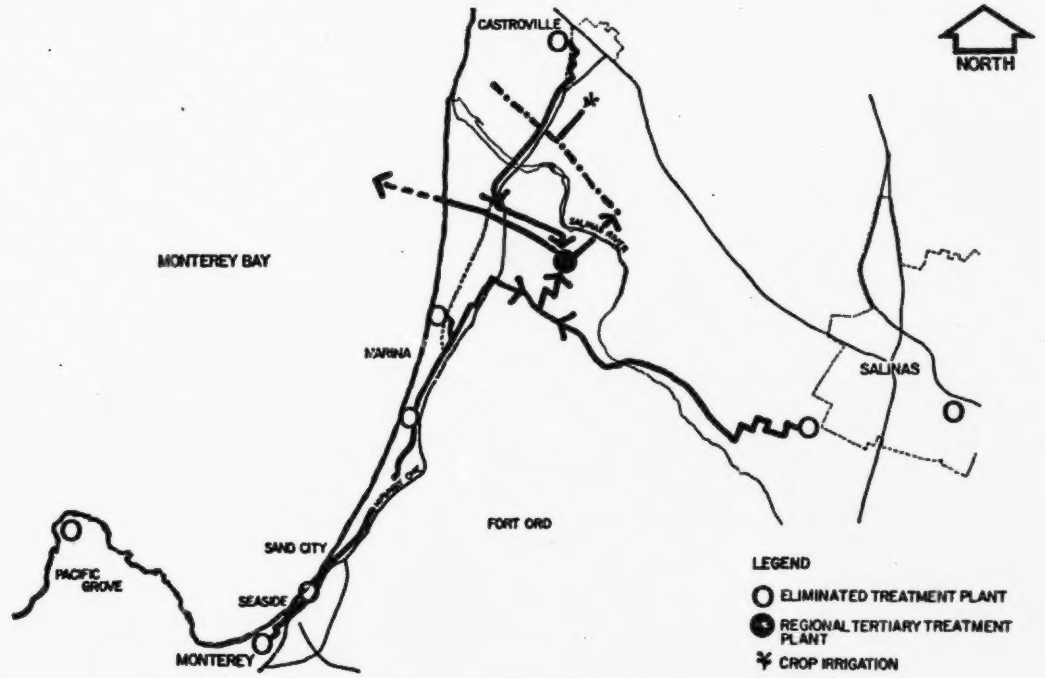
SALINAS RIVER
MONTEREY BAY
MARINA
SALINAS
FORT ORD
SAND CITY
PACIFIC GROVE
SEASIDE
MONTEREY
LEGEND
O ELIMINATED TREATMENT PLANT
■ REGIONAL SECONDARY TREATMENT PLANT

ALTERNATIVE I
OCEAN DISPOSAL
FIGURE 3

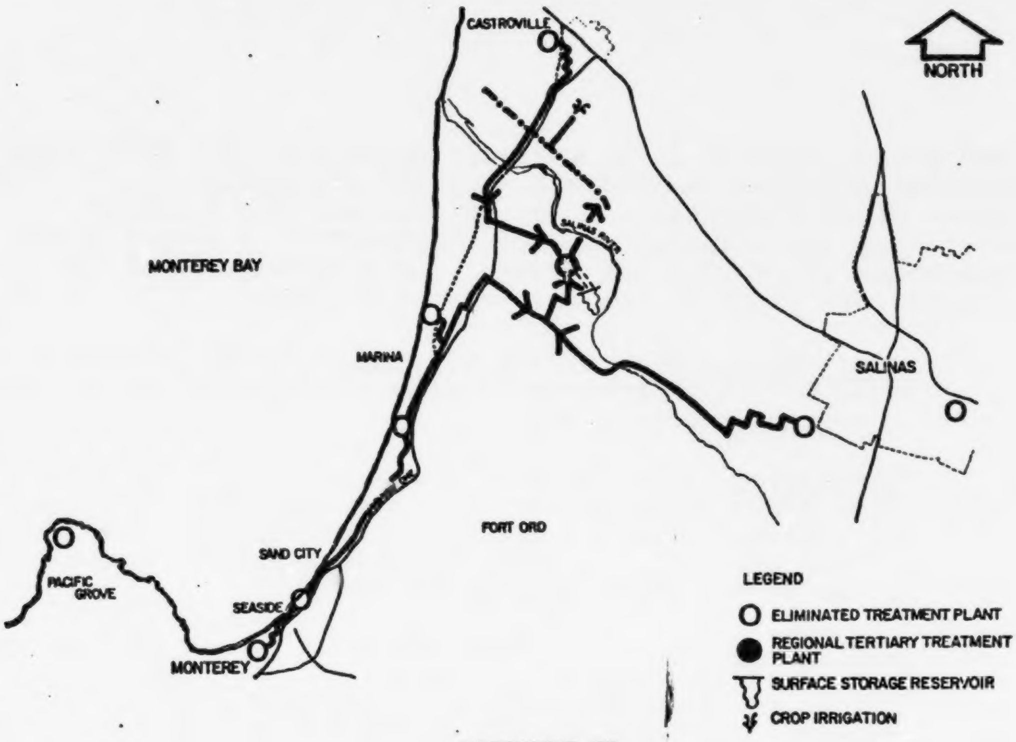

CASTROVILLE
NORTH
MONTEREY BAY
SALINAS RIVER
MARINA
SALINAS
FORT ORD
SAND CITY
PACIFIC GROVE
SEASIDE
MONTEREY
LEGEND
○ ELIMINATED TREATMENT PLANT
● REGIONAL TERTIARY TREATMENT PLANT
SURFACE STORAGE RESERVOIR
CROP IRRIGATION

ALTERNATIVE 134
CROP IRRIGATION/RIVER DISPOSAL

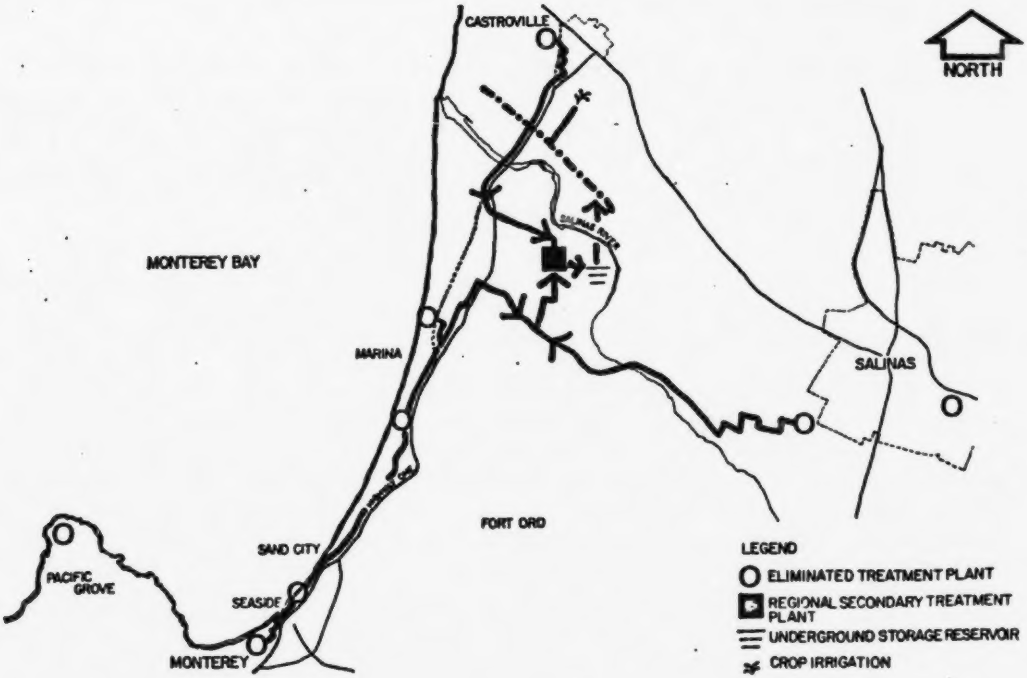

CASTROVILLE
NORTH
MONTEREY BAY
SALINAS RIVER
MARINA
SALINAS
FORT ORD
SAND CITY
PACIFIC GROVE
SEASIDE
MONTEREY
LEGEND
○ ELIMINATED TREATMENT PLANT
● REGIONAL TERTIARY TREATMENT PLANT
CROP IRRIGATION

ALTERNATIVE 166
CROP IRRIGATION/OCEAN DISPOSAL

FIGURE 4


CASTROVILLE
NORTH
SALINAS RIVER
MONTEREY BAY
MARINA
SALINAS
FORT ORD
SAND CITY
PACIFIC GROVE
SEASIDE
MONTEREY
LEGEND
○ ELIMINATED TREATMENT PLANT
● REGIONAL TERTIARY TREATMENT PLANT
SURFACE STORAGE RESERVOIR
CROP IRRIGATION

ALTERNATIVE 170
CROP IRRIGATION / SURFACE STORAGE


CASTROVILLE
NORTH
SALINAS RIVER
MONTEREY BAY
MARINA
SALINAS
FORT ORD
SAND CITY
PACIFIC GROVE
SEASIDE
MONTEREY
LEGEND
○ ELIMINATED TREATMENT PLANT
REGIONAL SECONDARY TREATMENT PLANT
UNDERGROUND STORAGE RESERVOIR
CROP IRRIGATION

ALTERNATIVE 171
CROP IRRIGATION/SUBSURFACE STORAGE

FIGURE 5

and acted strictly in an advisory capacity. The five alternatives selected all include regional consolidation of wastewater flows from Castroville, Salinas and the Monterey Peninsula-South Bay coastline cities for treatment at a single plant near the mouth of the Salinas River. The treatment level and disposal/reuse plans of the five are as follows:

> Alternative 1 - *Secondary treatment* (level 1A treatment, Table K-I) with year-round discharge through an *outfall* to central Monterey Bay.
>
> Alternative 134 - *Tertiary treatment* (level IV treatment, Table K-I) and conveyance to the Castroville area for irrigation reuse from approximately April to October and discharge to the lower Salinas River or lagoon (level III or V) for the remainder of the year.
>
> Alternative 166 - Tertiary treatment (level IV) and conveyance to the Castroville area for irrigation reuse from approximately April to October and discharge of secondary effluent through an outfall to central Monterey Bay (level 1A) for the remainder of the year. (This is Engineering Science, Inc.'s recommended plan.)
>
> Alternative 170 - Tertiary treatment (level IV) and conveyance to the Castroville area for irrigation reuse from approximately April to October and storage in a 900-acre reservoir for eventual irrigation reuse the remainder of the year.
>
> Alternative 171 - Secondary treatment with *filtration* (level II) and year-round discharge to 185 acres of *percolation* ponds for additional treatment and subsurface storage; repumping and conveyance to the Castroville area for irrigation reuse from approximately April to October.

Impacts

Construction

Many of the construction impacts are common to all five regional alternatives, as they would result from laying the common wastewater *interceptors* and building the regional treatment plant. These impacts include *short-term* traffic, residential and commercial disruption; creation of nuisance noise and dust; and elimination of grassland and grazing areas north of Marina. The major construction impacts specific to individual alternatives are as follows:

Alternative 1 - Excavation or covering of at least 6,400 linear feet of sandy bottom habitat in Monterey Bay for emplacement of an outfall; short-term *turbidity* of bay waters and possible beach erosion.

Alternative 134 - Excavation of a 120-acre storage pond in grassland habitat north of Marina (to be used for emergency storage, irrigation delivery flow regulation and storage of *effluent* during start-up of nitrification units in the treatment plant); possible loss of *riparian* habitat and short-term *sedimentation* of the Salinas River from irrigation delivery pipeline construction across the river.

Alternative 166 - Outfall emplacement impacts similar to those described for Alternative 1 and irrigation delivery pipeline impacts similar to those described for Alternative 134; removal of a small acreage of grassland habitat for a flow regulation and emergency storage reservoir (4 or 5 acres).

Alternative 170 - Irrigation delivery pipeline impacts similar to those of Alternative 134 and loss of up to 900 acres of grassland north of Marina for creation of a surface storage reservoir.

Alternative 171 - Irrigation delivery pipeline impacts similar to those of Alternative 134 and loss of up to 185 acres of grassland north of Marina for construction of percolation-infiltration ponds.

Operation

Impacts from operation of the five systems can be divided into social, economic and physical environment elements. The social impacts of the five are quite similar. Each would supply wastewater service to the same area and same population, thereby influencing growth in a similar manner. All except Alternative 1 would satisfy the public's expressed desire to reuse the wastewater to ease the local water shortage situation. Alternatives 170 and 171 could supply virtually all of the wastewater produced in the service area (14,500 *acre-feet* per year in 1982) for reuse, while Alternatives 134 and 166 would produce considerably less (8,400 acre-feet per year) for reuse.

The differences in the economic impact of the alternatives would reflect the differences in construction and operation and maintenance costs (A summary of costs is presented below). The cost to each household or business served by the new system would fluctuate according to the differences in these costs. A detailed financing and revenue plan has been prepared for the alternative (#166) recommended in the Facilities Plan;

this initial revenue program indicates the wastewater systems would require about $4.50 per month in user charges for single-family dwellings (Bartle Wells Associates, 1976). The local participating agencies would levy an additional charge to operate and maintain the local collector systems. Costs for industrial and commercial establishments would fluctuate according to size and water use. User costs for the other project alternatives would vary with the relative difference in construction and operation costs expressed in the table below.

ESTIMATED COST OF ALTERNATIVES***
(millions of dollars)

	Construction Cost	Operation and Maintenance Cost*(1996)	Total Present Worth (1975 $)
Alternative 1	53.8	2.2	55.6
Alternative 134			
Option A**	69.4	2.9	68.0
Option B	77.1	3.4	73.4
Alternative 166	64.7	2.4	60.1
Alternative 170	82.0	2.7	71.2
Alternative 171	51.5	2.4	53.5

* Dollars per year.

** Option A includes use of treatment levels III and IV, Option B includes levels V and IV (see Appendix K).

*** Detailed cost breakdowns are presented in Table M-5.

The impacts to the natural or physical environment vary considerably from one alternative to the next, but each would solve the major water quality and public health problems associated with existing wastewater discharges. (The "no action" alternative would perpetuate the problems.) Alternative 1 would relocate all discharges to a single spot in central Monterey Bay where new public health problems are not likely to develop. The change in water quality at the point of discharge could stimulate a local change in species diversity and a gradual increase in the *heavy metals* content of adjacent bottom sediments. The long-term effects on biota are not completely known, however. Studies of outfalls in similar marine habitats indicate sedimentation and scouring immediately adjacent to a raised pipe can permanently remove *benthic* organisms in a narrow band along the pipe itself (Weaver, pers. comm.). Species composition and diversity in the immediate vicinity of the freshwater plume is also likely to change. *Demersal* species tolerant to the freshwater source are likely to increase in abundance while less tolerant species are likely to avoid the area (Southern California Coastal Water Research Project, 1973). The predischarge oceanographic survey required by the SWRCB is designed to identify and elaborate on potential changes in the marine environment in the vicinity of the proposed outfall.

The four *wastewater reclamation* alternatives would discharge effluent to various land or surface water areas, with varying potentials for creating new water problems. The two storage alternatives (170 and 171) would apply the most wastewater to croplands and therefore have the greatest risk of eventually degrading the surface *aquifer* (which is already of poor mineral quality and seldom used) in the lower Salinas Valley and increasing quality problems associated with agricultural runoff. They would, however, provide the opportunity to reuse a very substantial amount of water, thereby limiting or potentially improving groundwater overdraft and salt water intrusion problems. Alternatives 134 and 166 would apply less wastewater to croplands, but would require non-irrigation season discharges to surface waters. The Alternative 166 bay discharge would have effects similar to those of the Alternative 1 outfall mentioned above but would occur only in the winter months when water-contact recreation is minimal. The Alternative 134 lower Salinas River discharge could create public helath and water quality problems in both the river and the Elkhorn Slough *estuary* system if the treatment plant malfunctioned, but water quality might also improve in low flow periods because of the increase in freshwater flows through the lagoon. Despite these potential new water-related problems, the reuse aspect of the four reclamation options is a significant environmental benefit to the water-short study area.

All five of the proposed regional alternatives would have an adverse but mitigable effect on fish, wildlife and vegetation along the lower Salinas River (between the Salinas discharges and the lagoon) from removal of the Salinas discharges. Because each alternative, except no action, has the same effect, this should not play a role in selecting a best project. Alternative 134 could, however, benefit the fish and wildlife resource in the Salinas River lagoon by providing an additional freshwater source during the non-irrigation (November to March) season; this would be especially valuable when low flows extend well into October or November.

While no action and Alternative 1 would have the least direct impact on land use, the four reclamation alternatives could have a significant impact on agricultural use in the Castroville area. Long-term use of wastewater for irrigation could adversely affect the viability of soils and require costly changes in farming practices. Crop marketability could also be adversely affected. In contrast, the new water source could prolong the viability of farming in areas that are facing a rapid deterioration in the quality of existing groundwater supplies. The *nutrients* in wastewater could also have some value as a source of fertilizer. These potential impacts, which are not completely predictable with present information, are to be studied in detail through a pilot agricultural irrigation project prior to initiating full-scale irrigation reuse.

Secondary Effects

Each of the proposed regional alternatives would have essentially the same indirect or secondary impact on the study area. The effects or impacts are related primarily to the level and location of population growth the new wastewater facilities could support. Typical effects associated with growth include deterioration of air quality, conversion of agricultural land, increased pressure on public facilities and cultural resources, and loss of open space and wildlife habitat. Wastewater facilities normally do not independently stimulate growth; there are a variety of services and economic conditions that must exist before new development can occur in a given region. New facilities can, however, remove an existing impediment to growth and play a major role in determining the location of growth.

The regional wastewater facilities have been designed to sewer 289,300 of an estimated 1995 study area population of 338,300. Because grant funding for the treatment plant is available for only a 10-year increment, it will initially be sized for a 1990 sewered population of about 263,600. With a 1970 study area population of 190,606 (including Ft. Ord), the facilities have been designed assuming a 25-year study area population growth of 147,694, or a compounded growth rate of about 2.3 percent.

The effects this growth might have on the local environment depends primarily on the location and type of new development. An analysis of existing local plans indicates some infilling may occur in the Monterey Peninsula cities and in Salinas, but the major expansions are likely to occur north of Salinas, near Castroville and Marina, and along the Salinas-Monterey and Castroville-Prunedale transportation corridors. The land use changes would be the most obvious impact of the growth. Prime agricultural land being actively cultivated in the Salinas and Castroville areas would probably be lost to residential-commercial use, as would open space and grazing land along the two transportation corridors (Highway 68 and 156) and in the vicinity of Marina. Provision of the usual public services and facilities would also be required (i.e., schools, roads, police and fire protection), placing additional responsibilities and costs on local government.

An increase in local water demand is perhaps the most serious potential problem associated with growth in the planned service area. The severe water shortage on the Monterey Peninsula and the rapid overdrafting and deterioration of groundwater supplies in the Castroville-Salinas area would be further compounded if growth is allowed to occur in the absence of new sources of water and/or major water conservation efforts. Agricultural reuse of the new treatment system's wastewater, as proposed in several of the project alternatives, could mitigate in-part future increases in local water demand.

Increases in urban land also affect local water quality conditions by increasing *non-point sources* of pollution. Urban runoff is typically high in metallic compounds, biostimulants, oil and grease, and *biochemical oxygen demand* (BOD). Erosion associated with construction activity adds to siltation of surface waters. The increase in amount of *impermeable* ground surface (pavement, structures) adds to the volume of surface runoff and decreases groundwater recharge from precipitation.

The principal potential impacts of growth on vegetation and wildlife include removal of vegetation, loss of habitat and increased human activity in or near natural areas. Growth along the Monterey-Salinas corridor and the Prunedale-Castroville corridor would eliminate oak-grassland and possibly riparian wildlife habitat. Additional development in the Moss Landing-Castroville area would increase human pressures on the valuable Elkhorn Slough estuarine complex, which is inhabited by several rare and endangered bird species. Sound planning for specific development projects can avoid the more significant losses of habitat, but the general increase in human activity is unavoidable.

If development occurs at the rate projected by local planning agencies (and as assumed for project planning), oxidant levels in Monterey County can be expected to improve slightly. Federal health-related standards for oxidant level will probably continue to be exceeded at least a few times each year unless highly favorable weather conditions persist during the 1985-1990 period. Nitrogen dioxide levels will increase substantially and can probably be expected to exceed the California 1-hour standard on an occasional basis during the 1990-1995 period.

Mitigation Measures

A wide variety of *mitigation* measures have been suggested to reduce the severity of or eliminate the potential direct and indirect adverse impacts of the proposed wastewater project. Controls to reduce the impact of construction activity (to be implemented by the wastewater management agency and its construction contractors) include: limiting construction activity and equipment to the smallest area possible; locating corporation yards and materials stockpiles in areas that avoid degrading local aesthetics; providing alternate or secondary traffic routes around construction areas so as to minimize traffic disruption; and revegetating all disturbed surfaces to minimize erosion and aesthetic degradation.

In order to mitigate the reduction in dry-weather stream flow in the lower Salinas River (caused by removing the existing Salinas wastewater discharges), several alternative sources of surface flow have been suggested, including pumping of groundwater, releasing additional water from upstream reservoirs, and use of treated wastewater from the new regional plant. The feasibility of these options remains to be further investigated; implementation would be by the local wastewater management agency.

Numerous recommendations have been made to control the effects of the irrigation reuse of the wastewater. Implementation of an irrigation demonstration project is the most important factor, as this would accurately identify problems. Changes in plowing and irrigation practices have also been suggested to maintain agricultural productivity and minimize groundwater impacts in the face of a change in water supply. The farmers themselves would be responsible for these mitigations.

Potential impacts on surface and groundwater quality are best controlled by providing the best possible quality of wastewater. This should be accomplished by the wastewater management agency through proper source control (i.e., requiring pretreatment or elimination of waste flows with high pollutant levels at the source of the flow, prior to discharge to the wastewater collection system) and use of the most advanced treatment processes that are economically feasible.

A summary of potential mitigation measures and the entities most likely to implement them follows the Recommendation section.

Recommendation

The soundest wastewater treatment and disposal system for north Monterey County could actually contain elements of several alternatives. First, regional interceptors and a central treatment plant are an acceptable framework for the system. Reuse through irrigation should also be a part of the system. An irrigation demonstration project has already been initiated to resolve agricultural and public health questions related to reuse; testing is scheduled to commence in the 1978 growing season. The storage alternatives (170 and 171), when considered strictly as diagrammed in Figure 5 (no secondary disposal mode), are not conducive to staging. The treatment and storage facilities must be constructed simultaneously. They also require large land areas. Therefore, storage should be considered only after reuse is proven feasible and it is felt the costs are justified. Storage could then be added to either Alternative 134 or 166.

It appears that a choice must be made as to which disposal method should be used while the agricultural demonstration project is in progress. The choice is clearly between ocean discharge (Alternative 166) and lower Salinas River discharge (Alternative 134). The ocean outfall would utilize a generally acceptable, reliable disposal method. The river disposal could be beneficial to fish and wildlife resources in the Salinas River lagoon, but further analysis of river and lagoon water quality conditions is needed before the full impact of this option is known. Deep water ocean disposal is clearly best able to meet the PL 92-500 goal of assuring "fishable-swimmable" water quality conditions in the area's surface waters by 1983. However, ocean disposal alone does not offer the best opportunity to reuse a valuable water resource and reduce salt water intrusion/overdrafting in the Salinas Valley. Therefore, a decision must be reached as to whether the benefit to the lagoon wildlife is significant enough to delay a choice between ocean and river disposal and initiate a complete study of lagoon water quality in light of the anticipated higher construction and operation costs of the river disposal alternative.

SUMMARY - IMPACT MITIGATION MEASURES

Mitigation	Possible Implementing Entity(ies)*
CONSTRUCTION IMPACTS	
o Source control of noise, air emissions, dust.	Construction contractor
o Avoid, minimize removal of vegetation; keep disturbed area as small as possible, reseed.	Construction contractor
o Reroute, control flow of traffic.	Construction contractor
o Avoid construction through critical wildlife habitat, scenic areas, agricultural land.	MPWPCA
OPERATION IMPACTS	
Soils-Agriculture	
o Utilize highest level of wastewater treatment possible, implement source controls.	MPWPCA
o Practice deep soil tillage	Local farmers
o Increase water applications to *leach* salts.	Local farmers
o Blend water sources.	Local farmers
o Irrigate only at night	MCFCWCD, CID, local farmers
Water Quality	
o Increase irrigation efficiency to reduce agricultural runoff.	Local farmers
o Pretreat agricultural runoff before discharge	Local farmers, RWQCB
o Utilize highest level of wastewater treatment possible, implement source controls.	MPWPCA
o Install tile underdrains in wastewater irrigation areas.	Local farmers
o Dewater *sludge* prior to landfilling.	MPWPCA
Public Health	
o Avoid wastewater irrigation in the vicinity of domestic wells.	MCEHD, local farmers
o Line all wastewater storage ponds with impermeable materials.	MPWPCA
o Install tile underdrains in wastewater irrigation areas.	Local farmers
o Follow wastewater irrigation guidelines of State Department of Health, Title 22 of California Administrative Code.	MCEHD, CDH
o Utilize highest level of wastewater treatment and *disinfection* possible.	MPWPCA
o Implement vector control program at reservoirs through local mosquito abatement districts.	MPWPCA, NSVMAD
Resources	
o Utilize those treatment processes with lowest chemical and energy requirements.	MPWPCA
o Select pipeline routes, treatment plant location with least pumping requirements.	MPWPCA
o Utilize digestor, landfill-generated methane for treatment plant energy source.	MPWPCA
Wildlife, Vegetation	
o Maintain summer flow in the lower Salinas River by:	
1. Pumping groundwater near Salinas.	MPWPCA, City of Salinas
2. Pumping regional plant effluent upstream for discharge.	MPWPCA
3. Retain Salinas plant wastewater discharge to river.	City of Salinas, MPWPCA

Mitigation	Possible Implementing Entity(ies)*
4. Additional upstream water releases.	MPWPCA, MCFCWCD
o Use of treated wastewater for habitat enhancement on Department of Fish and Game wildlife area.	DFG, CDH, MCEHD
o Utilize highest level of wastewater treatment possible, implement source controls.	MPWPCA
Economics	
o Implement least costly treatment and disposal alternative possible.	MPWPCA
o Limit treatment facilities sizing to that level considered grant fundable by EPC and SWRCB.	MPWPCA
o Eliminate as much infiltration/inflow as possible.	MPWPCA, local public works departments
o Initiate water conservation and wastewater flow reduction programs.	MPWPCA, SWRCB, RWQCB, local government, public at large
GROWTH-RELATED IMPACTS	
General - Land, Water, Wildlife, Vegetation Resources	
o Size wastewater treatment facilities for existing service area population only.	MPWPCA
o Encourage high density development in newly urbanized areas.	Local planning agencies, city councils, MCBS
o Encourage infill rather than peripheral development or sprawl.	Local planning agencies, city councils, MCBS
o Utilize Williamson Act land protection.	Local planning agencies, city councils, MCBS, local landowners
o Implement a wastewater reclamation alternative to augment local water supplies.	MPWPCA
o Modify general plans and zoning ordinances to protect recognized valuable resources, i.e., rare and endangered plants, wildlife, unique vegetation.	Local planning agencies, city councils, MCBS
Air Quality	
o Adopt more stringent vehicle emission standards.	EPA, ARB
o Adopt more stringent point source emission standards.	MBUAPCD
o Control development of new industrial sources of pollution through general plan and zoning amendments, changes in conditional use permit procedures.	Local planning agencies, city councils, MCBS
o Reduce overall vehicle travel by:	
1. Modifying general plans and zoning ordinances to encourage infill and reduce urban sprawl.	Local planning agencies, city councils, MCBS
2. Design new residential areas to facilitate bus service.	Local planning agencies, MPT
3. Improve local transit service, encourage carpooling.	Local government, MPT
4. Encourage new development planning that facilitates non-motorized travel.	Local planning agencies
o Invoke temporary treatment plant flow limitations until alternate mitigations are devised.	EPA, SWRCB

* FOOTNOTES FOR SUMMARY - IMPACT MITIGATION MEASURES

ARB	California Air Resources Board
CDH	California Department of Health
CID	Castroville Irrigation District
DFG	California Department of Fish and Game
EPA	U. S. Environmental Protection Agency
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MCBS	Monterey County Board of Supervisors
MCEHD	Monterey County Environmental Health Department
MCFCWCD	Monterey County Flood Control and Water Conservation District
MPT	Monterey Peninsula Transit
MPWPCA	Monterey Peninsula Water Pollution Control Agency
NSVMAD	Northern Salinas Valley Mosquito Abatement District
RWQCB	Central Coastal Regional Water Quality Control Board
SWRCB	California State Water Resources Control Board

INTRODUCTION

Purpose and Objectives of the Environmental Impact Statement

The National Environmental Policy Act of 1969 (NEPA) requires all federal agencies which propose actions that would significantly affect the quality of the human environment to prepare an Environmental Impact Statement (EIS) on these actions. The EIS is intended to be a "full disclosure" of impacts which would result from a project or action, and must follow specific guidelines established by the Council on Environmental Quality (CEQ). In the selection of a wastewater facilities plan, it is the intent of NEPA that alternatives be evaluated and a plan selected on the basis of all environmental considerations, not just monetary costs.

The California Environmental Quality Act of 1970 (CEQA), which was modeled after NEPA, also requires preparation of an Environmental Impact Report (EIR) when state or local agency activities may have a significant impact on the environment. Because the North Monterey County regional wastewater project can be 75 percent funded by the Environmental Protection Agency (EPA) and 12-1/2 percent funded by the State Water Resources Control Board (SWRCB) as a part of the Construction Grants Program authorized by the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500), it requires both CEQA and NEPA action. In order to eliminate repetition in the report preparation process, EPA and MPWPCA have jointly participated in preparation of this document, which satisfies both the EIS and EIR requirements.

The EIS objective is to identify significant environmental impacts and resolve issues of public controversy associated with the proposed North Monterey County Facilities Plan. This EIS, following the guidelines of the NEPA, objectively evaluates combinations of project alternatives and determines which appear to be environmentally the most acceptable. All relevant monetary, social and environmental effects are included in the analysis.

Data for this EIS have been compiled from various existing studies of the Monterey-Salinas area, numerous personal conversations with involved individuals and additional studies conducted by the EIS consultants. A complete listing of references is in the Bibliography.

The EIS process encourages public input into the decision-making process. This draft EIS is being widely circulated for public comment. Approximately thirty days after its release, a public hearing will be held to receive oral comments. Written comments will be accepted for 45 days after its release. Following the hearing and the 45-day public comment period, a final EIS will be prepared, addressing all pertinent questions raised.

Area Affected

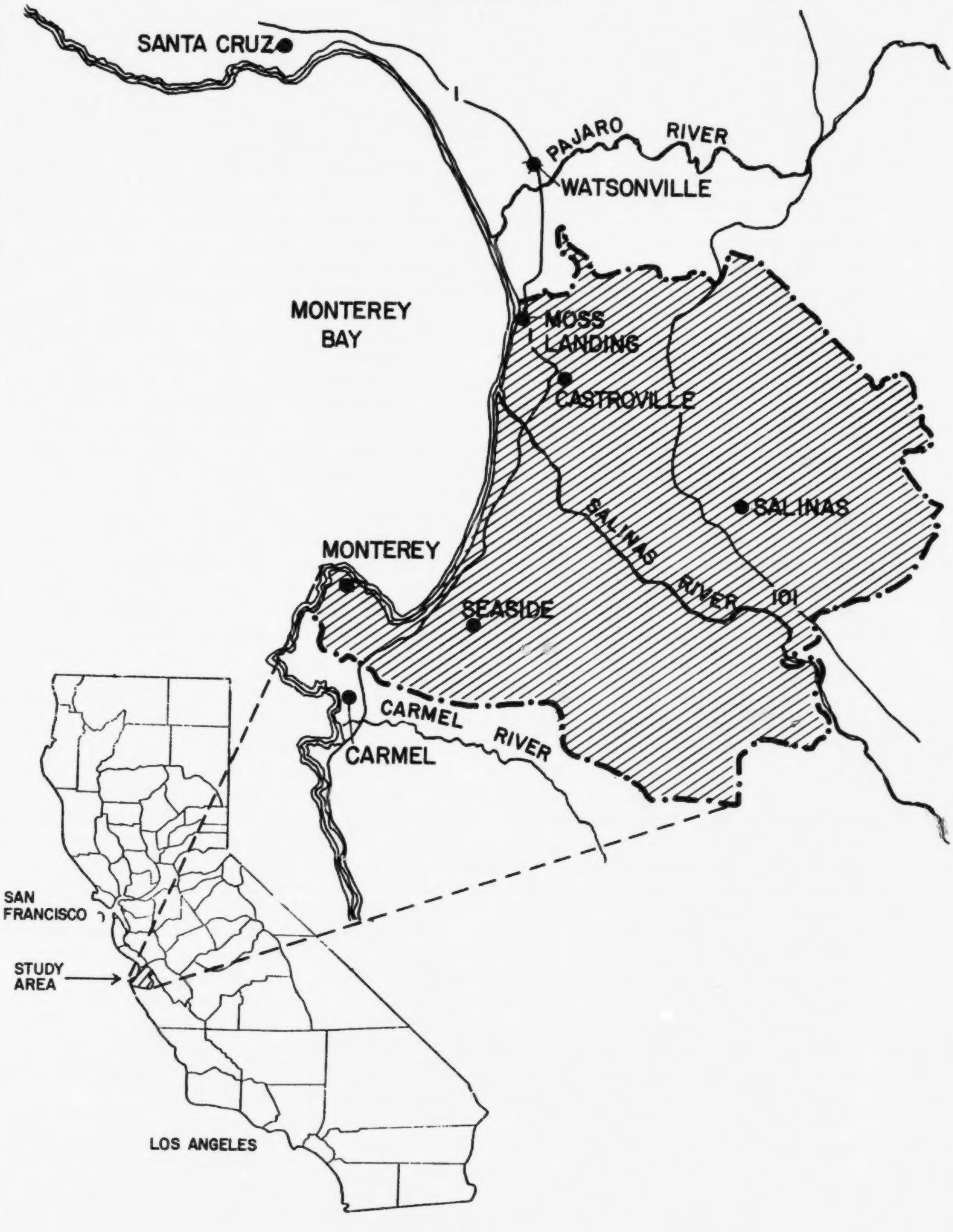
The project under consideration in this EIS is located in northern Monterey County, California, approximately 75 miles south of San Francisco (see Figure 6). The major communities involved are the cities of the Monterey Peninsula and Salinas. A detailed description of the region is presented in the Environmental Setting section.

Background and History

The existing wastewater treatment and disposal systems in the Monterey-Salinas area are contributing to undesirable water quality conditions in several of the region's surface waters, including the Salinas River, Tembladero and Elkhorn Sloughs, and Monterey Bay. The adverse aesthetic and public health conditions being created in these waters are due in part to both the quality of wastewater effluent being discharged and inadequate dilution and dispersion provided by the receiving waters. These conditions and increasing state and federal restrictions on disposal of wastewater have prompted wastewater management planning efforts in northern Monterey County.

Serious groundwater overdrafting and a water supply shortage also exist in the Monterey Peninsula and Salinas Valley area. Heavy domestic, industrial and agricultural groundwater pumping in the lower Salinas Valley has caused sea water to intrude into the underground aquifers that are tapped for local water supply. Water consumption in the Monterey-Seaside area has outstripped developed surface and groundwater supplies, resulting in a California Public Utilities Commission-imposed moratorium on water connections, resulting in a building ban. The need to improve wastewater treatment and remedy the water shortage situation have both influenced the wastewater management planning described in the following paragraphs.

FIGURE 6
LOCATION MAP


SANTA CRUZ
1
PAJARO RIVER
WATSONVILLE
MONTEREY BAY
MOSS LANDING
1
CASTROVILLE
SALINAS
SALINAS RIVER
101
MONTEREY
SEASIDE
CARMEL RIVER
CARMEL
SAN FRANCISCO
STUDY AREA
LOS ANGELES

The Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) require that all *municipal wastewater* treatment facilities produce an effluent meeting secondary treatment standards (defined in "EPA Secondary Treatment and Treatment Information", Federal Register, Vol. 40, No. 159, August 15, 1975) by July 1, 1977 and that there be no discharge of pollutants to the nation's waters by July 1, 1985. Section 303(e) of P.L. 92-500 provides for the preparation of basin-wide plans to determine the best practical method of accomplishing the law's objectives. The California State Water Resources Control Board (SWRCB) and the Central Coastal Regional Water Quality Control Board (RWQCB) have cooperated in preparing a basin plan for the central coastal basin, which includes most of Santa Cruz, San Benito, Monterey, San Luis Obispo and Santa Barbara Counties. The plan establishes water quality objectives and *beneficial uses* for the waters of the basin and makes recommendations for the wastewater treatment and disposal facilities necessary to meet the objectives and protect the beneficial uses. The basin plan recommendation for northern Monterey County calls for consolidation of wastewater flows from the Monterey Peninsula and Bay communities, Salinas, and Castroville with treatment at a single regional plant near the mouth of the Salinas River. The wastewater would be treated to a secondary level and discharged to Monterey Bay initially. Reclamation and reuse for crop irrigation would be investigated and implemented where demand is established. Regionalization of treatment and disposal is recommended to eliminate current discharges to southern Monterey Bay and the lower Salinas River, to encourage the large-scale reuse of wastewater and to improve wastewater management in the area. EPA, in their letter of approval of the Basin Plan, stipulated that the plan's recommendations for municipal facilities will be modified on a case-by-case basis of subsequent, more detailed investigations, including preparation of environmental impact reports or statements, justify the need for reconsideration.

The Monterey Peninsula Water Pollution Control Agency (MPWPCA) was formed in 1971 to develop a new wastewater management system for the cities on the Monterey Peninsula. Since publication of the area's basin plan (which recommended a consolidated wastewater management approach for the Monterey County communities bordering Monterey Bay), MPWPCA's study scope has expanded to include the Salinas and Castroville areas. The MPWPCA joint powers agreement now includes the City of Monterey, City of Pacific Grove, City of Salinas, County of Monterey, Marina County Water District and the Seaside County Sanitation District. The U. S. Army at Ft. Ord is an ex-officio member. Using funds established by P.L. 92-500 and administered by the SWRCB through the Clean Water Grant Program, MPWPCA is preparing a wastewater facilities plan for most of northern Monterey County.

The planning was initiated in March of 1975 when MPWPCA received a facilities planning grant from the SWRCB. Subsequently, Engineering Science, Inc. was retained to prepare the facilities plan. A list of 173 possible alternative plans were developed by the engineers. Guidelines and objectives included in the basin plan and discharge requirements established by the Central Coastal RWQCB were used to develop these alternatives. In June of 1975, a contract was let by MPWPCA to Jones & Stokes Associates, Gruen Gruen + Associates, and Don Owen & Associates to prepare an EIS on the facilities plan. The recently established "piggy-back" process, whereby the facilities plan and the EIS are prepared simultaneously rather than in sequence, was adopted to shorten the planning time frame. Since that time, the 173 alternatives have been subjected to engineering, economic and environmental analyses by the engineering and environmental consultants and a technical advisory committee (TAC) composed of federal, state and local planning and regulatory agencies. Public workshops were held in Monterey on September 10, 1975 and February 9, 1976 and in Salinas on September 11, 1975 and February 10, 1976 to receive public reactions to the proposed alternatives. As a result of this planning process, five alternatives were selected for detailed analysis. The Facilities Plan for North Monterey County and this EIS present that detailed analysis. The plan recommended for implementation must meet the objectives of P.L. 92-500 and the Central Coastal basin plan in a cost-effective manner. The Environmental Protection Agency must also insure compliance with all national environmental quality legislation prior to issuing grant funds for detailed design of a recommended plan.

In preparing the Central Coastal Basin Plan, the SWRCB evaluated the possibility of including the Carmel area in the Monterey Bay regional system. The cost analysis indicated pumping to Monterey was the most costly of four proposed alternatives, therefore treatment and disposal through the Carmel Sanitary District facilities was recommended. The Pebble Beach-Carmel-Carmel Valley area was placed in a sub-basin of its own, separated from the Monterey Bay Coastal area. Facilities planning in the two areas has proceeded separately since that time. The North Monterey County Facilities Plan has not included capacity for the Carmel area in its facilities design. Interceptor, treatment plant and disposal facility sizes would probably have to be increased to accommodate Carmel flows.

Although Moss Landing is within the North Monterey County Facilities Plan study area, the severity of its existing wastewater treatment problems has prompted a separate facilities planning effort. Currently, septic tanks are providing for most of the treatment in Moss Landing, but many are failing due to adverse soil and groundwater conditions. A draft facilities plan and environmental impact report were prepared for Moss Landing and submitted to MPWPCA and the State Clearinghouse for review (Jones & Stokes Associates, Inc., 1976b). A public hearing on the draft EIR was held in Moss Landing on August 30, 1976 and a final EIR was subsequently prepared. Economic, engineering and environmental analyses of alternative wastewater treatment and disposal systems for the Moss Landing area are included in these documents. Copies of the EIR are on file in area libraries and at the MPWPCA offices.

Existing Facilities

Sewage treatment in the facilities plan study area is currently supplied by nine public treatment facilities (including one industrial facility at Salinas), several private community-type systems and numerous individual septic tanks. The location, discharge point, present service area, design capacity, and current average flows of the public treatment systems are shown in Figure 2. The Salinas industrial ponds are shown in the figure but are not included in the current planning effort, as they have sufficient capacity and treatment to meet projected treatment requirements and demands. Each of the eight domestic wastewater systems must undergo some modification in order to comply with either PL 92-500 or the basin Water Quality Control Plan.

The City of Salinas operates two domestic wastewater facilities, the Salinas main plant and the smaller Salinas-Alisal plant. Both plants provide a secondary level of treatment and discharge to the lower Salinas River just west of the City of Salinas. In order to conform to the SWRCB's basin plan, these plants must remove their discharges from the river or upgrade treatment to a tertiary level. The basin plan recommends abandonment of the Salinas plant and transport of Salinas' wastes to a regional system.

The Castroville County Sanitation District plant produces a secondary level of effluent and discharges to Tembladero Slough. However, in order to meet the 1977 secondary requirements of PL 92-500, it must improve its treatment. This improvement may be accomplished as part of a proposal to sewer the community of Moss Landing and transport its wastes to the Castroville plant for treatment. The SWRCB basin plan recommends Castroville remove its discharge to Tembladero Slough and initiate land disposal until the Moss Landing and Prunedale areas are sewered and connected to Castroville. They would then be tied as a unit into a regional system.

The City of Pacific Grove is currently discharging primary effluent to the ocean at Point Pinos. As part of stage 1 of a regional consolidation project, an interceptor is already designed to transport Pacific Grove's wastewater to the Monterey plant for treatment and disposal. This is planned as an interim step, with the combined Pacific Grove-Monterey flow eventually going to a regional system.

The City of Monterey plant is being upgraded to discharge a secondary-level effluent to the ocean. This discharge and those of Ft. Ord, Seaside County Sanitation District and Marina County Water District lie within a discharge prohibition zone established by the SWRCB in the basin plan. The prohibition seeks to eliminate all domestic waste discharges to a sluggish circulation area in southern Monterey Bay, landward of a line drawn from Point Pinos to the mouth of the Salinas River (see Figure 24). The basin plan calls for removal of these discharges by July 1, 1977 and consolidation of the flows into a regional system.

The Seaside County Sanitation District is currently discharging *primary treated* effluent to the near-shore waters of Monterey Bay. As mentioned above, the SWRCB basin plan calls for elimination of this discharge. The treatment level does not meet PL 92-500 1977 requirements.

The Ft. Ord main treatment facility currently discharges secondary effluent to the ocean across Indian Head Beach. Designs have been prepared to eliminate this discharge in 1977 and initiate a land disposal and irrigation reuse project on Army property near Fritzche Airfield. Ft. Ord is scheduled to tie into the proposed regional wastewater treatment system once it is constructed.

The Marina County Water District also operates a secondary level wastewater treatment system with disposal to Monterey Bay. In order to comply with the SWRCB south bay discharge prohibition, Marina must eliminate or extend its outfall. The basin plan recommends removal of the ocean discharge and consolidation with a regional system.

The current facilities planning being conducted by MPWPCA is designed to meet the requirements of PL 92-500 and comply with the discharge prohibitions and recommendations in the SWRCB basin plan. The planning also seeks to respond to environmental concerns expressed by residents of the study area. The current water supply shortage on the Monterey Peninsula and the rapid deterioration of the quality of groundwater in the lower Salinas Valley have stimulated support for reclamation and reuse of domestic wastewater as a water conservation measure.

Report Organization

The report is organized into a number of separate chapters, each with a different purpose. Preceding this Introduction, a Report Summary lists the major elements of the proposed wastewater project and their probable impact upon the study area environment. This provides a broad overview of the contents of the full EIS. The Environmental Setting describes the regional and site specific conditions currently existing within the project's main sphere of influence. Legal, regulatory and institutional constraints to development and implementation of the facilities plan are presented so that evolution and selection of the recommended plan can be better understood. The next section describes the development of project alternatives and the nature of those five plans being given detailed consideration in the facilities plan and this EIS. Finally, a number of separate chapters list the probable environmental impacts of each alternative plan and measures that can be taken to reduce or eliminate the impacts. A summary analysis of these impacts provides an overview of the detailed individual impact descriptions. The Glossary at the end of the report defines a number of terms that should be familiar to reviewing-agency technical staff but may be unfamiliar to the layman. These words are italicized where they first appear in the text.

Much of the technical data analyzed in preparing the environmental impact statement has been removed from the body of the text and included in appendices. This is done to improve the general readability of the report, yet still supply the technical backup for conclusions reached in the EIS. Figures and tables included in the appendices are given the appendix letter designation followed by a number (i.e., Table A-1 is in Appendix A, Figure B-2 is in Appendix B, etc.).

Public Input

Public participation in preparing this draft environmental impact statement started in the earliest stages of project planning. The Monterey Peninsula Water Pollution Control Agency Facilities Plan Technical Advisory Committee (TAC) assembled monthly throughout the last year and a half to consider environmental, economic and envineering aspects of the proposed plan. This TAC is composed of representatives from federal, state, regional and local public agencies that are in some way affected by wastewater collection, treatment and disposal ope-ations. The TAC's role in developing project alternatives is described in the Alternative Projects section of this report.

Questions and concerns of the public at large were solicited at four widely publicized public workshops held in Monterey and Salinas (September 10, 1975 and February 9, 1976 in Monterey and September 11, 1975 and February 10, 1976 in Salinas). The proposed project alternatives were explained and their potential impacts were listed prior to inviting questions and comments from the attendees. Strong public support was given to reclamation and reuse of wastewater at both workshops. Concerns were expressed about the location and type of reuse, however. It was mentioned that the location and type of reuse, plant may preclude reuse in the water-short Monterey Peninsula area. There was also concern over the potential adverse effects of reusing the water for irrigation of unprocessed food crops. Other opinions expressed at the workshops included support for use of land application as a wastewater treatment process, and a desire to have the inclusion of Carmel into the regional system considered in the planning process. Numerous other personal interviews and conversations have been held with government personnel and local residents in collecting and analyzing material for this report.

Public circulation of this draft EIS represents an additional effort to solicit public input into the facilities planning process. Public comment on the contents of this document and the direction of the plan itself may be made in the form of written communications or oral testimony at the EIS public hearing. All pertinent questions raised by the public over the draft EIS will be responded to in the final EIS.

ENVIRONMENTAL SETTING

Introduction

The physical, biological, and socio-cultural aspects of the project study area make up its Environmental Setting. The qualities of the environmental setting must be understood to determine what is necessary to solve environmental problems and to determine the impacts of building a regional wastewater treatment and disposal system in northern Monterey County.

The existing environment is described first regionally and then at the project site, where different project facilities could have varying impacts.

Existing Physical Environment

Location

The project study area is in northern Monterey County, California on the coast, about 75 miles southeast of San Francisco (see Figure 6). The area includes the incorporated Cities of Monterey, Salinas, Pacific Grove, Seaside, Sand City, Marina, and Del Rey Oaks, the unincorporated communities of Moss Landing and Castroville and Ft. Ord Military Reservation (see Figure 2).

Elkhorn Slough, Strawberry Canyon, and Echo Valley are on the northern border. The Monterey-San Benito County line, Quail and Jacques Hanlon Creeks, several sections of road, and a stretch of the Salinas River form the eastern boundary. The southern border follows various land grant boundaries just north of the Carmel River, and parallels the Pacific Grove-Carmel Highway across Monterey Peninsula. The Pacific Ocean marks the project's western edge. Some of these external boundaries are also boundaries of Association of Monterey Bay Area Governments (AMBAG) planning areas.

The 332 square miles of the study area are shown on U.S. Geological Survey topographic maps of Chualar, Hollister, Marina, Monterey, Mt. Harlan, Moss Landing, Prunedale, Rana Creek, San Juan Bautista, Salinas, Seaside, and Spreckels (7-1/2' series).

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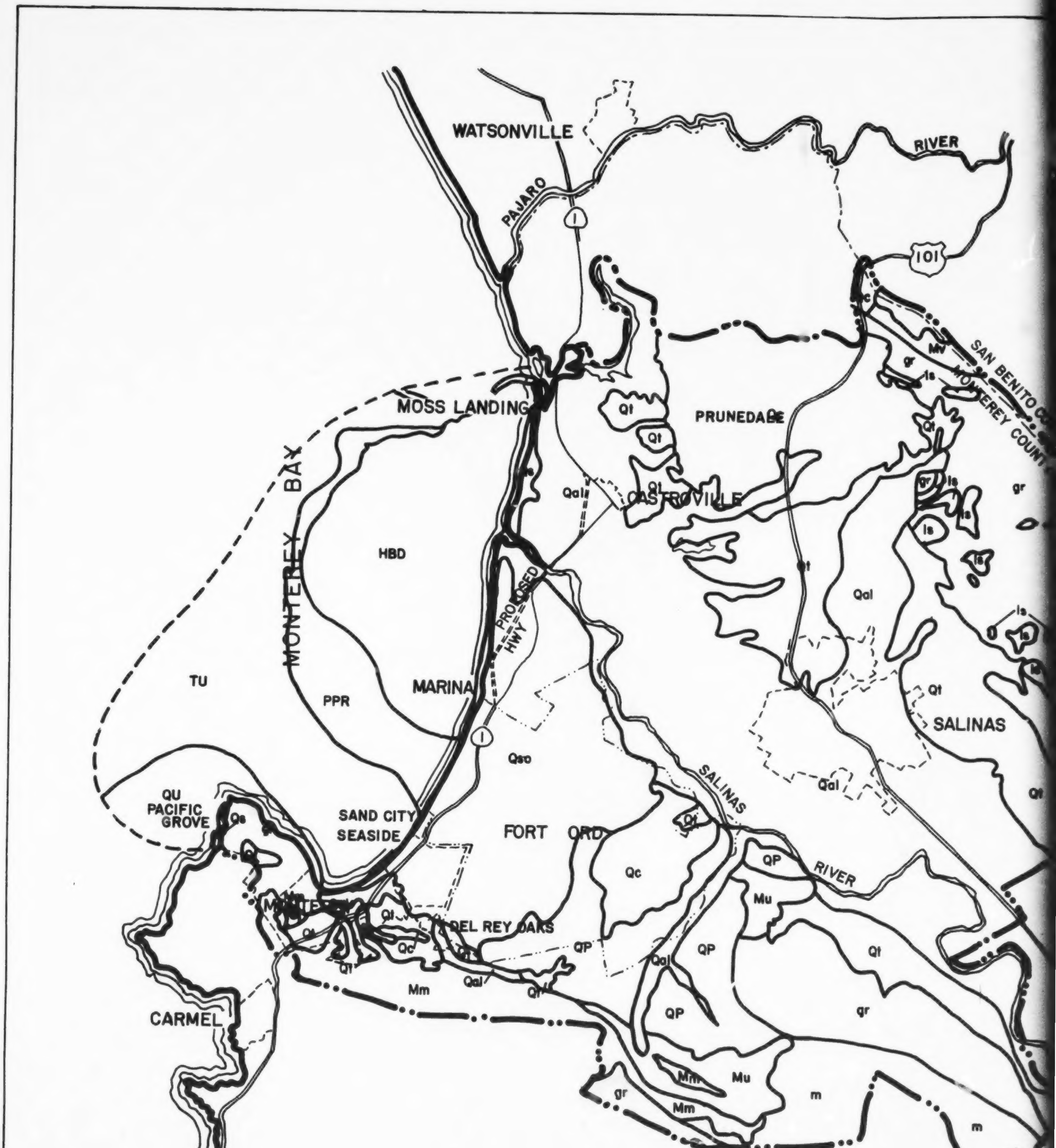
Land Resources

Topography. The topography of the study area is dominated by the Salinas River Valley and the Sierra de Salinas and Gabilan Mountain Ranges. Elevations range from sea level along the Pacific Coast to 3,500-foot Mt. Toro in the Sierra de Salinas and 3,100-foot Fremont Peak in the Gabilan Range.

The Salinas Valley ranges in elevation from sea level at the coast to about 30 feet above sea level 20 miles inland at the study area's eastern boundary. Gabilan Range elevations vary from 3,100 feet on the north edge of the study area to 2,500 feet in the south. The Sierra de Salinas Mountains reach 3,500 feet at the southeastern tip of the study area (see Figure 1).

Geology. The Gabilan and Sierra de Salinas Ranges are part of the northwest to southeast trending central California coastal mountains. Within the study area, each is composed chiefly of Mesozoic *granitic* rock with small areas of Pre-Cretaceous *metamorphic* material (see Figure 7). The granitic rock includes granite, adamellite, grandodiorite, tonalite, and diorite. The metamorphic rock is limestone and dolomite. Plio-Pleistocene and Pleistocene non-marine terrace deposits border the northern end of the Gabilans near Prunedale and the northern end of the Sierra de Salinas along El Toro Creek. The hills that stretch from the main block of the Sierra de Salinas near El Toro Creek to the coast at Carmel are *marine sediments* of Middle Miocene age (Jennings and Strand, 1959). These hills are the northwestern tip of the Santa Lucia Range. The granitic and marine sedimentary rocks form the basement complex of both ranges, while the non-marine sedimentary rocks are formed of material eroded from and deposited on the basement complex.

The Salinas Valley lies between the two mountain ranges and is one of the longest and broadest of the many valleys created by complex folding and faulting throughout California's Central Coast Range *geomorphic* province. The northern and southeastern borders of the Salinas Valley are covered by Quaternary nonmarine terrace deposits originally washed from the bordering mountains. These sedimentary rocks are replaced by older terrace deposits and younger dune sands along the western valley fringe from Spreckels to the coast. The valley trough and the *floodplains* of Gabilan Creek, Toro Creek, and Elkhorn Slough are composed of *Recent* alluvium deposited by existing streams.


WATSONVILLE
PAJARO
RIVER
1
101
SAN BENITO CO
MONTEREY COUNT
MOSS LANDING
PRUNEDALE
MONTEREY BAY
CASTROVILLE
HBD
PROPOSED HWY
TU
PPR
MARINA
Qso
SALINAS
QU
PACIFIC GROVE
Qs
SAND CITY
SEASIDE
FORT ORD
SALINAS
RIVER
MONTEREY
DEL REY OAKS
CARMEL
Qt
Qal
Qc
QP
Mu
Mm
Mv
gr
ls
m

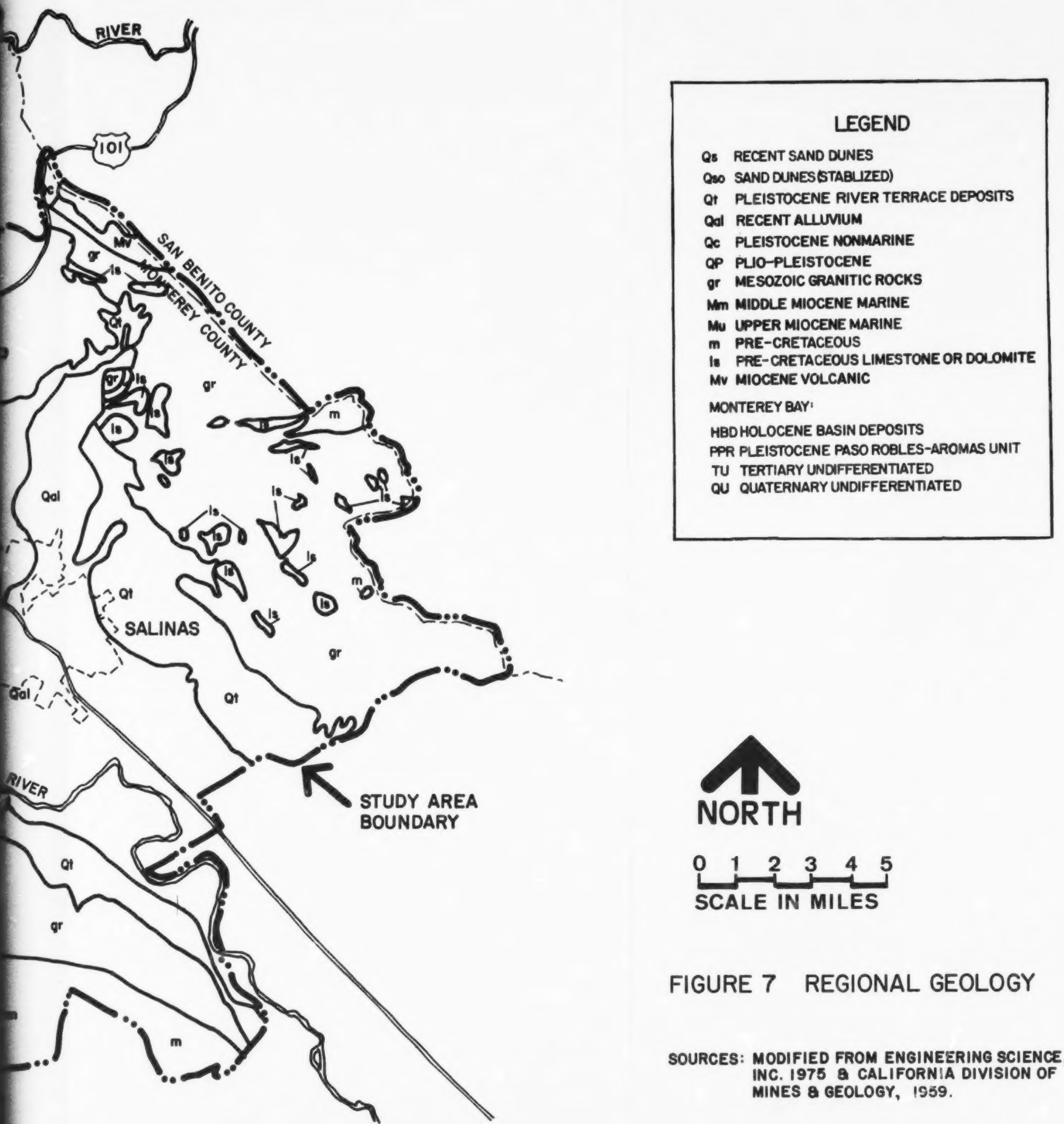

RIVER
101
SAN BENITO COUNTY
MONTEREY COUNTY
Mv
gr
ls
Qt
Qal
SALINAS
m
RIVER
STUDY AREA BOUNDARY
LEGEND
Qs RECENT SAND DUNES
Qso SAND DUNES (STABLIZED)
Qt PLEISTOCENE RIVER TERRACE DEPOSITS
Qal RECENT ALLUVIUM
Qc PLEISTOCENE NONMARINE
QP PLIO-PLEISTOCENE
gr MESOZOIC GRANITIC ROCKS
Mm MIDDLE MIOCENE MARINE
Mu UPPER MIOCENE MARINE
m PRE-CRETACEOUS
ls PRE-CRETACEOUS LIMESTONE OR DOLOMITE
Mv MIOCENE VOLCANIC
MONTEREY BAY:
HBD HOLOCENE BASIN DEPOSITS
PPR PLEISTOCENE PASO ROBLES-AROMAS UNIT
TU TERTIARY UNDIFFERENTIATED
QU QUATERNARY UNDIFFERENTIATED
NORTH
0 1 2 3 4 5
SCALE IN MILES

FIGURE 7 REGIONAL GEOLOGY

SOURCES: MODIFIED FROM ENGINEERING SCIENCE, INC. 1975 & CALIFORNIA DIVISION OF MINES & GEOLOGY, 1959.

The coastal portions of the study area are underlain chiefly by Recent sand dune and alluvial deposits. The Monterey Peninsula, however, is geologically complex with basement granitic and marine sedimentary rock interspersed with Quaternary non-marine terrace deposits and Recent sand dunes (Jennings and Strand,1959).

Monterey Bay itself is underlain by several sedimentary deposits including Miocene mudstone (Monterey formation); Pleistocene red sand, gravel and clay tuff (Paso Robles-Aromas unit); and Recent (Holocene) deltaic deposits at the mouth of the Salinas River. In contrast, the bay bottom just offshore from Pacific Grove is composed of Mesozoic granite (Greene, 1970).

Seismic Features.

Faulting Hazards. California's central coast is an extremely active seismic area. The study area lies between two major fault zones -- the San Andreas to the east and the Sur-Nacimiento to the west. Within this belt are numerous smaller faults, both paralleling and transecting the major mountain ranges (see Figure 8).

Most of the earthquake *epicenters* mapped in the study area by the U. S. Geological Survey (Greene, et.al., 1973) are associated with the San Andreas fault zone, which borders the eastern base of the Gabilan Range and is about 13 miles northeast of Salinas. The Sur-Nacimiento fault zone lies offshore about 10 nautical miles southwest of Monterey, but few quakes have been associated with it since epicenter locations were first accurately mapped by the California Department of Water Resources in 1926.

Several faults between these two major zones are considered seismically active. The Palo Colorado-San Gregorio fault zone which is slightly inshore from the Sur-Nacimiento as it crosses Monterey Bay, is described as active by both Burkland and Associates (1975) and the U. S. Geological Survey (see Table D-1). Recent study indicates that the Palo Colorado-San Gregorio may actually be linked to an extremely long, continuous central coastal fault stretching from Bolinas in the north to near Pt. Conception on the south. It is unclear whether the Palo Colorado-San Gregorio or the Sur-Nacimiento is part of this long fault system south of the study area where the two converge near Pt. Sur (Jennings, pers. comm.). If this is one continuous fault system, there is a greater chance of large magnitude quakes occurring along the coast than previously thought. The Monterey Bay fault zone is also considered

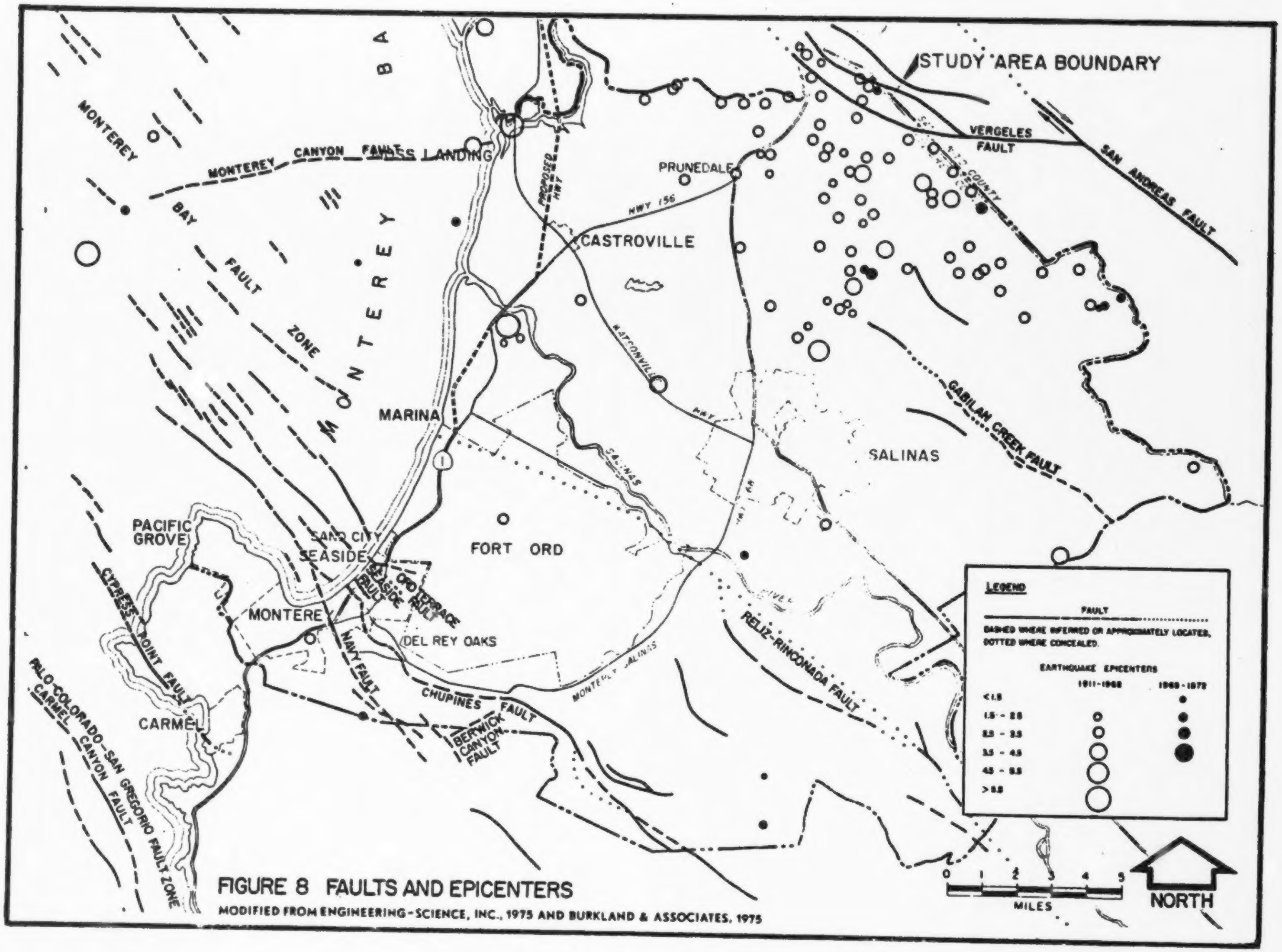

STUDY AREA BOUNDARY
SAN ANDREAS FAULT
VERGELES FAULT
SANTA CRUZ COUNTY
PRUNEDALE
HWY 156
CASTROVILLE
MOSS LANDING
PROPOSED HWY
MONTEREY CANYON FAULT
MONTEREY BAY FAULT ZONE
MONTEREY BAY
MARINA
WATSONVILLE HWY
SALINAS
GABILAN CREEK FAULT
FORT ORD
SAND CITY
SEASIDE
SEASIDE FAULT
ORD TERRACE FAULT
PACIFIC GROVE
MONTERE
DEL REY OAKS
NAVY FAULT
CHUPINES FAULT
BERWICK CANYON FAULT
RELIZ-RINCONADA FAULT
CYPRESS POINT FAULT
CARMEL
PALO COLORADO-SAN GREGORIO FAULT ZONE
CARMEL CANYON FAULT
LEGEND
FAULT
DASHED WHERE INFERRED OR APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED.
EARTHQUAKE EPICENTERS
1911-1968
1969-1972
<1.5
1.5 - 2.5
2.5 - 3.5
3.5 - 4.5
4.5 - 5.5
>5.5
0
1
2
3
4
5
MILES
NORTH

FIGURE 8 FAULTS AND EPICENTERS

MODIFIED FROM ENGINEERING-SCIENCE, INC., 1975 AND BURKLAND & ASSOCIATES, 1975 active. This series of short faults crosses the floor of the southern bay and may link with a series of other faults on the landward rim of the bay. Numerous earthquake epicenters have been mapped within or slightly seaward of the bay, including two of 6.1 magnitude (Richter scale) in 1926. Twenty-eight epicenters have been recorded in the vicinity since 1969 (Greene, et.al., 1973).

Several inland faults between Monterey and Seaside (the Navy, Berwick Canyon, Chupines, Seaside and Ord Terrace faults) appear to be extensions of the Monterey Bay northwest to southeast trending fault zone. Another inland fault, the Reliz-Rinconanda (King City fault in Greene, et.al., 1973), has acted as the offset plane between the Sierra de Salinas Mountains and the Salinas Valley. Since 1969 numerous small tremors have been recorded along this fault southwest of Gonzales (Greene, et.al., 1973), but it is listed as only potentially active by Burkland and Associates (1975). On the eastern side of the study area, there are only two significant faults in the Gabilan foothills -- the Gabilan Creek fault and the Vergeles, a branch of the San Andreas fault zone, both listed as potentially active by Burkland and Associates (1975).

Tsunami Hazard. Tsunamis (seismically-induced sea waves) can inundate low-lying coastal areas. Though the Elkhorn Slough-Moss Landing Harbor area, Monterey Harbor, and the Monterey Bay coastline in general have experienced minor tsunamis, there has been little or no damage and no loss of life. The U. S. Army Engineer Hydraulics Laboratory (Garcia & Houston, 1975) recently completed a detailed analysis of potential tsunami-induced wave runup in the Monterey Bay region. Their report indicates that the Aleutian trench is the only area likely to generate a tsunami with a once-in-one hundred year frequency rate capable of affecting the Monterey Bay area. Their calculations list the 100-year tsunami runup for the study area coastline to be between 5.9 and 7 feet above mean sea level (msl). This means simply that on the average, once in every 100 years a tsunami capable of inundating coastal areas up to 7 feet above mean sea level is likely to strike the Monterey Bay region. The 500-year frequency tsunami was calculated to have a runup of between 11.5 and 13.6 feet above msl in the study area.

The 100-year wave would have its most serious effect on persons and structures located at Moss Landing and Monterey Harbors. Boats, moorings and adjacent commercial-industrial buildings would be inundated and could receive major structural damage. Extensions of the runup through the Salinas and Pajaro Rivers and Elkhorn Slough were not calculated by the Army Engineers. Therefore, no estimate can be made of the potential hazard inland along these waterways.

Soils. The Report and General Soil Map - Monterey County, California (U.S. Department of Agriculture, Soil Conservation Service, 1968) presents general *soil associations* for the entire study area. A table of soil characteristics and qualities, from this report, is in Appendix C. More detailed data on soil types likely to be influenced by project features are in the Site-Specific Environment section. Soil associations are mapped in Figure 9.

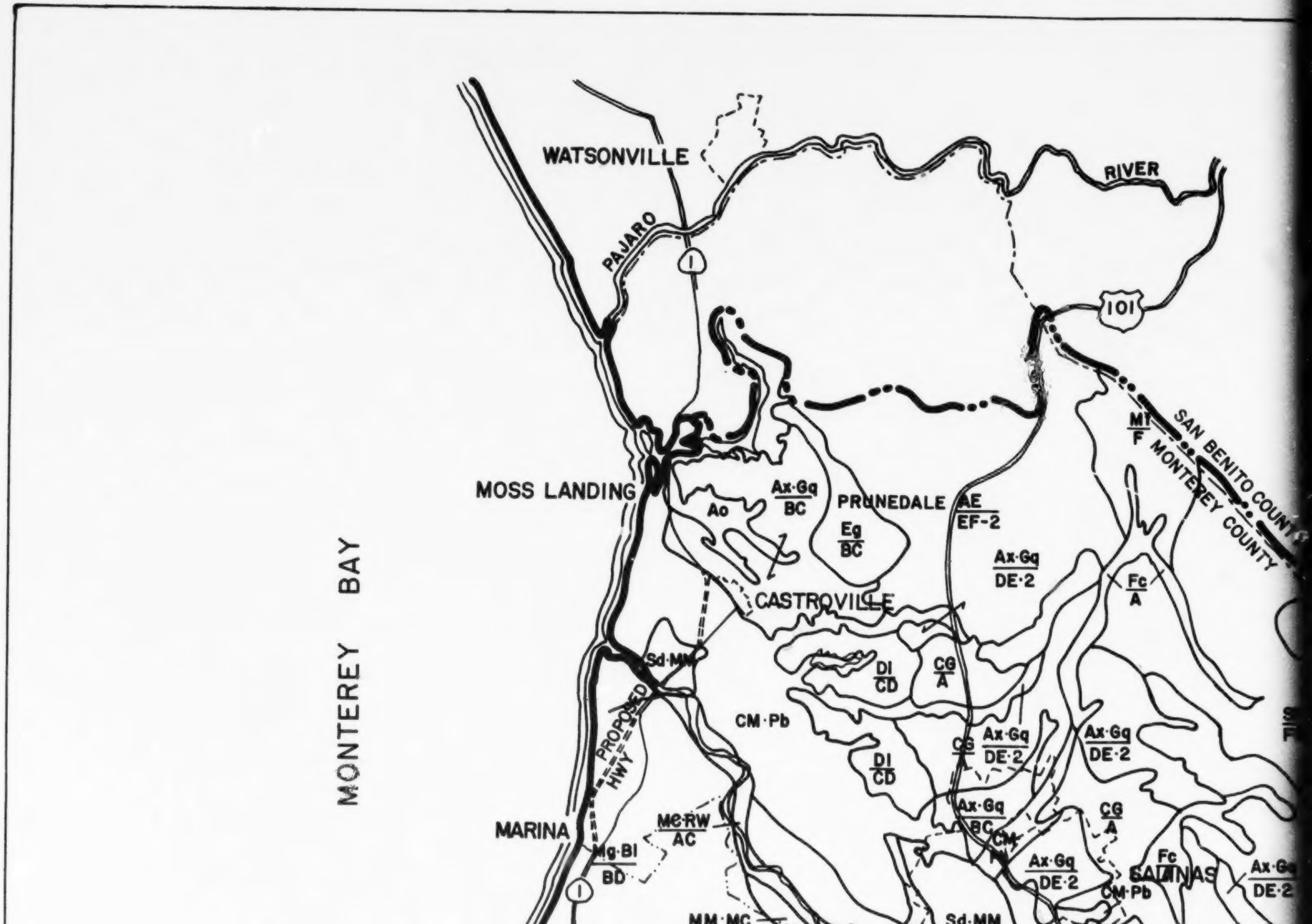
The Salinas River floodplain and the floodplains of the small creeks draining the Gabilan Range are covered predominantly by moderately deep to very deep, highly fertile soils (Cropley, Farallone, Metz, Mocho, Salinas, Clear Lake, and Pacheco soils). These soils support most of the study area's intensive agriculture, including row and field crops.

The soils covering the gently sloping *alluvial fans* and low terraces bordering the Salinas River floodplain are also valuable for production of row and field crops, but are slightly less fertile and have hard clay loam and silty loam subsoils, reducing *permeability* (Chualar and Farallone soils).

The high terrace lands and low rolling hills bordering the Salinas Valley and El Toro Creek are covered with coarser grained, well drained soils with hard clay subsoils. Although used for a variety of agricultural pursuits, including row crops, pasture and range, they are of marginal agricultural value because of their low fertility and significant erosion potential. Antioch, Gloria and Placentia soils are included in this group.

The upland soils of the Gabilan and Sierra de Salinas Mountains have formed mainly on granite base rocks and are therefore coarse grained and well to excessively drained. These generally shallow soils support rangeland, recreation, and wildlife; the steep slopes and erosion hazard limit other uses. Cieneba, Sheridan and McCoy soils are found over most of the Gabilan Range upland, while Vista and Sheridan soils are mapped in the Sierra de Salinas. The mountainous areas north of the lower Carmel River are formed on marine sediments rather than granite; the soils are therefore finer textured shalely loams and clay loams with less severe slopes and erosion hazard. Some dry-farmed crops are grown on these Santa Lucia and Gazos soils.

Soils along the study area's coastline are formed principally on marine sedimentary rocks and sand dune deposits. The Narlon association soils of the Monterey Peninsula are loamy fine sands with clay subsoils developed from coastal marine sediments. They typically support a dense woodland


WATSONVILLE
PAJARO
RIVER
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101
MOSS LANDING
Ax·Gq/BC
Ao
PRUNEDALE
AE/EF·2
Eg/BC
MT/F
SAN BENITO COUNTY
MONTEREY COUNTY
MONTEREY BAY
Ax·Gq/DE·2
Fc/A
CASTROVILLE
Sd·MM
Dl/CD
CG/A
PROPOSED HWY
CM·Pb
CG/A
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Dl/CD
MARINA
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CM·Pb
MM·MC
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SALINAS
Sd·MM
CM·Pb
PACIFIC GROVE
SAND CITY
SEASIDE
FORT ORD
AE/EF·2
Ax·Gq/DE·2
RIVER
MM·MC
Ax·G/BC
MONTEREY
DEL REY OAKS
Gq·Py/EF·2
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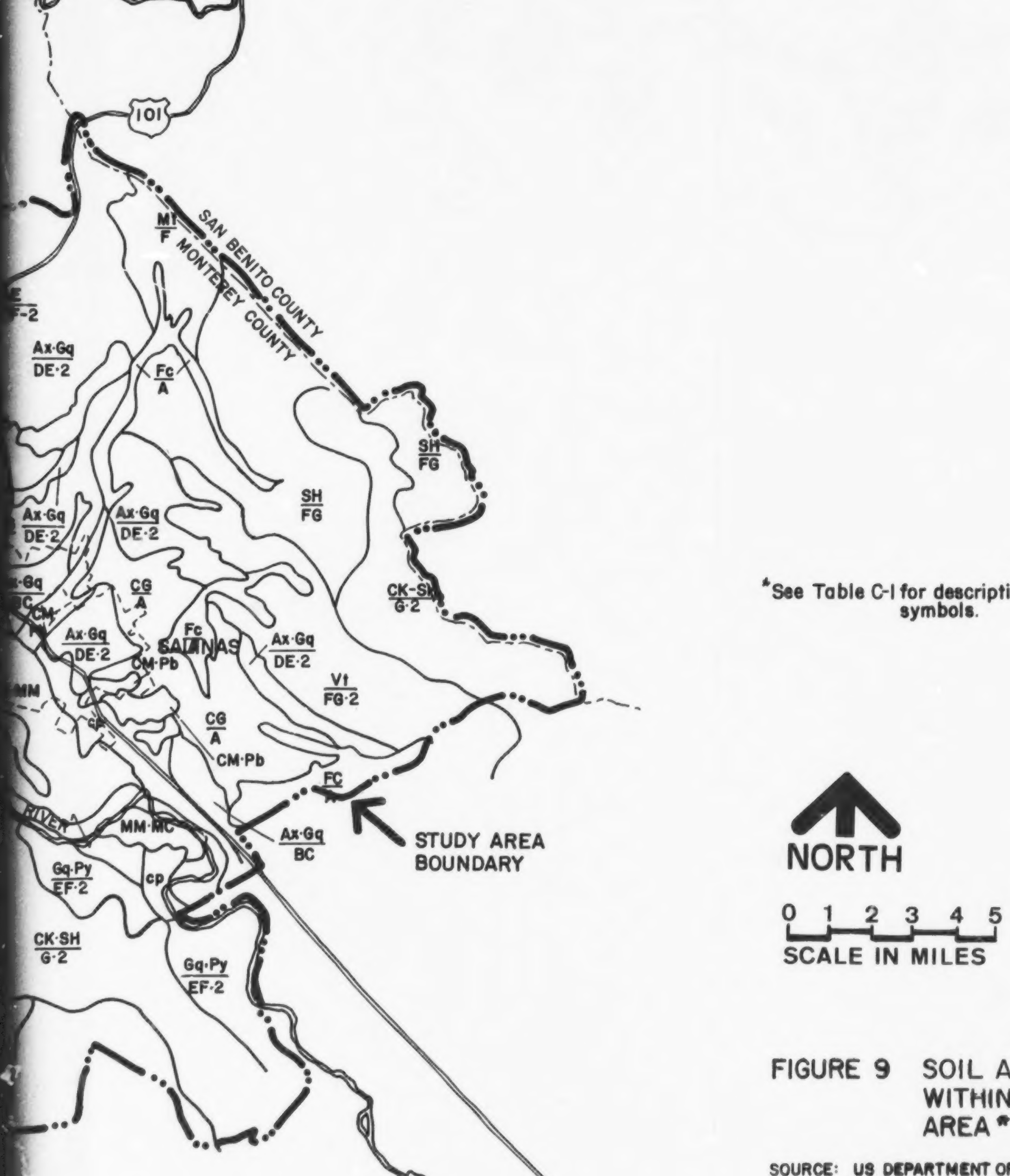
CARMEL
AE/EF·2


RIVER
101
SAN BENITO COUNTY
MONTEREY COUNTY
Mt/F
E/EF-2
Ax·Gq/DE·2
Fc/A
SH/FG
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Ax·Gq/DE·2
Ax·Gq/BC
CM·Pb
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CK-SH/G·2
Ax·Gq/DE·2
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SALINAS
CM·Pb
Ax·Gq/DE·2
Vt/FG·2
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CG/A
CM·Pb
FC/A
STUDY AREA BOUNDARY
RIVER
MM·MC
Ax·Gq/BC
Gq·Py/EF·2
cp
CK·SH/G·2
Gq·Py/EF·2
NORTH
0 1 2 3 4 5
SCALE IN MILES

*See Table C-1 for description of mapping symbols.

FIGURE 9 SOIL ASSOCIATIONS WITHIN THE STUDY AREA*

SOURCE: US DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, 1968.

but are now highly urbanized. Arnold and Marina-Baywood associations are mapped on the sand dune deposits occurring along the coast and inland from Monterey north to the mouth of the Salinas River. These soils are excessively drained, moderately erosive and extremely low in fertility. Most of them are either urbanized or within the Ft. Ord military post. They are of limited agricultural value.

Archeology. Only sites proposed for facilities construction were surveyed for archeological and historical resources. First, records of the Cultural Resources Section of the California Department of Parks and Recreation were searched (see Appendix F for a letter to the Department of Parks and Recreation). The National Register of the Historic Places was also checked. A literature search was made to identify additional archeologic/historic work of significance done within the study area.

All proposed alternative interceptor alignments and treatment plant sites as well as existing plant sites were then traversed on foot by a team of experienced archeologists. Ground surfaces were carefully examined for evidence of historic and prehistoric occupation or use. Where further definition was warranted, small trowel holes were dug to maximum depths of 25 centimeters (cm), and where cultural evidence was found, the locations were plotted on the appropriate USGS 7.5-minute topographic maps. One probable prehistoric site (JS-MP-1) was found near the Seaside treatment plant. A site survey form detailed critical data on artifacts and the extent and location of the site. The site covers about 30 meters by 30 meters and is on the western slopes of a small sand dune. Evidence of prehistoric habitation is sparse, but there is enough to consider it a site. Cultural material includes chert flakes, retouched flake scrapers, an obsidian flake, thermal fractured rock (broken cooking stone), shell fragments, and mammal bone fragments.

The presence of site JS-MP-1 is probably related to the availability of freshwater in the lagoons immediately to the south. Other sites may be present, but the unstable sand dunes have concealed any surface evidence of prehistoric occupation at alternative plant sites or along alternative interceptor routes.

The lack of sites in areas adjacent to the Salinas River on the secondary terraces (proposed interceptor alignments) cannot be explained. It may be that these areas were subject to periodic inundation and were considered uninhabitable by the Indian population.

Land Use

Agricultural. Outside the incorporated municipalities, a large portion of the study area's land is agricultural; 94 percent is categorized as either agricultural or vacant (Table 1 and Figure 10). The Salinas-Castroville area offers ideal growing conditions for artichokes, broccoli, cauliflower, celery and lettuce; strawberries are grown in the uplands. South of Salinas, further from the marine weather influence, carrots, beets, beans and tomatoes are grown in quantity. The Salinas Valley as a whole is one of the richest and most productive produce-crop areas in the United States.

Table J-5 shows agricultural production for Monterey County in terms of crop-acres, the number of acres producing crops. Since land is often double-cropped, crop-acres exceed physical land acreage.

Of the six major crops in the lower Salinas Valley, lettuce has historically been the most important. This crop accounted for 82 percent of crop-acres used for these six crop types in 1950; however, by 1974, lettuce had dropped to 53 percent. Other crops in this group -- artichokes, broccoli, cauliflower, celery and strawberries -- have become increasingly important over time, with crop-acreage increasing by factors of 2 (artichokes), 3 (broccoli and strawberries) and 5 (celery); cauliflower crop-acres have increased from a mere 250 in 1950 to over 9,000 in 1974.

The value of these crops (stated in Table J-6, using 1975 dollars for easy comparison) shows that the six principal crops increased in value 127 percent between 1950 and 1970, and 173 percent between 1950 and 1974, despite a rise in crop-acres of only 50 percent.

Open Space. Open space is provided by numerous public and private recreational lands in addition to agriculture within the study area.

State parks and beaches cover 441 acres. They include Monterey, Salinas River, and Zmudowski State Beaches, and Fremont Peak, Jetty Beach and Asilomar Beach State Parks. There are four regional parks (Toro, Jack's Peak, Laguna Seca Recreation Area, and Salinas River Recreation Area) and over 240 acres of municipal parks (Monterey County Transportation Study, 1974). The California Department of Fish and Game manages an 800-acre Wildlife Area (acreage includes part of the bay and the lagoon) near the mouth of the Salinas River that is also open to the public. Numerous public and private golf courses (15 in the county) offer additional open space.

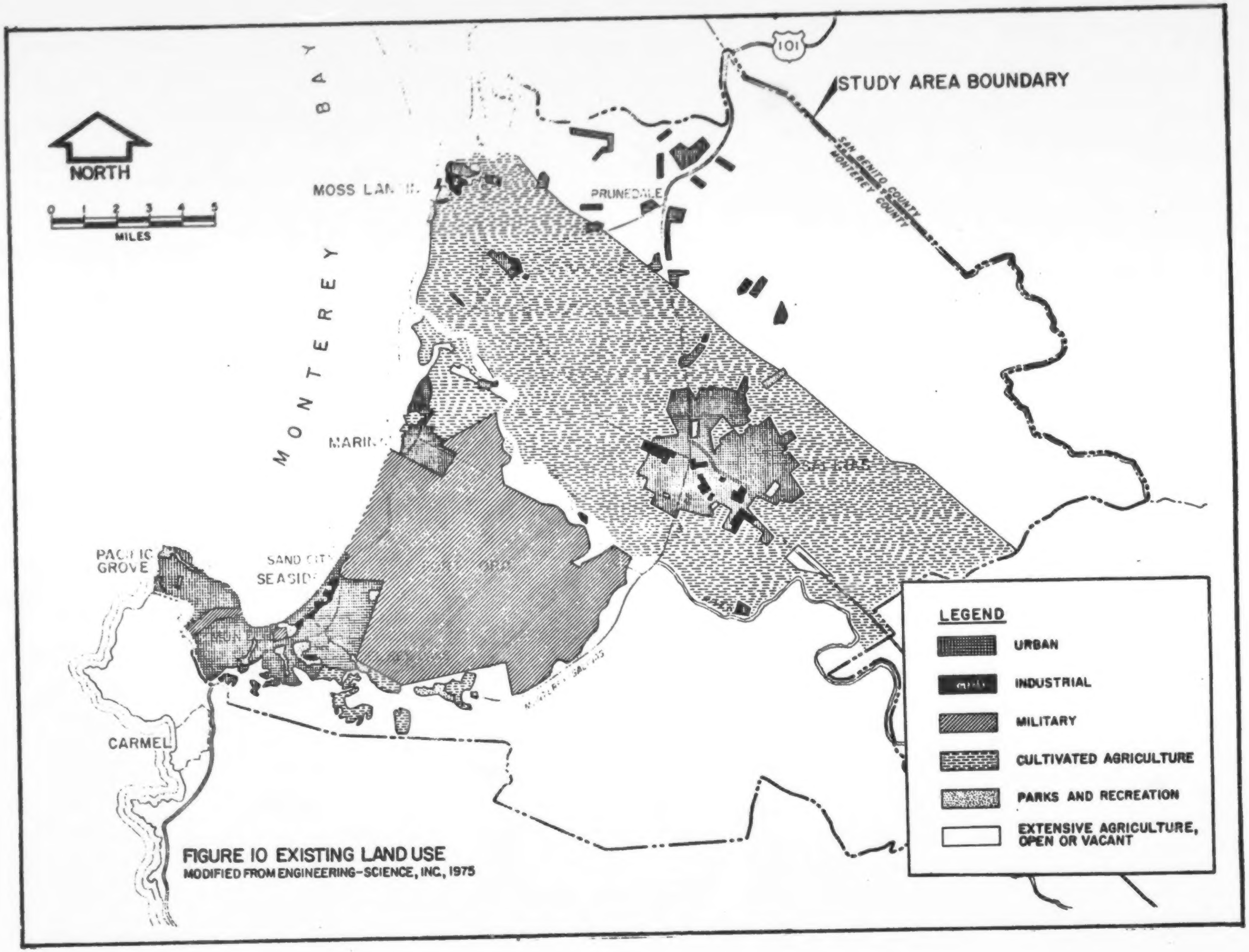

NORTH
0 1 2 3 4 5
MILES
MONTEREY BAY
MOSS LAN
PRUNEDALE
101
STUDY AREA BOUNDARY
SAN BENITO COUNTY
MONTEREY COUNTY
MARIN
SAND CITY
SEASIDE
PACIFIC GROVE
CARMEL
LEGEND
▦ URBAN
■ INDUSTRIAL
▨ MILITARY
▤ CULTIVATED AGRICULTURE
▩ PARKS AND RECREATION
☐ EXTENSIVE AGRICULTURE, OPEN OR VACANT

FIGURE 10 EXISTING LAND USE
MODIFIED FROM ENGINEERING-SCIENCE, INC, 1975

TABLE 1

Study Area Land Use Inventory, 1974
(in acres)

Category	Del Rey Oaks	Monterey	Pacific Grove	Salinas	Sand City	Seaside	Total Incorporated	Unincorporated	TOTAL	% of Study Area
Residential	123	1,161	818	2,512	7	874	5,495	12,502	17,997	.9
Commercial	8	262	104	698	3	146	1,231	897	2,128	.1
Industrial & Utilities	1	96	9	334	38	6	484	13,263	13,747	.7
Transportation	66	1,135	410	1,983	91	468	4,153	15,219	19,372	.9
Public & Institutional	47	1,246	319	884	1	4,245	6,742	78,954	85,696	4.2
Total Developed	245	3,900	1,660	6,411	140	5,749	18,105	120,835	138,940	6.8
Agricultural,* Vacant & Other	50	1,201	23	2,327	207	122	3,930	1,911,667	1,915,597	93.2
TOTAL	295	5,101	1,683	8,738	347	5,871	22,035	2,032,502	2,054,537	

* For the purposes of Monterey County Transportation Study, there was no need to separate agricultural and vacant land.

Source: Monterey County Transportation Study, 1974.

Circulation Network. In Monterey County there are 2,103 miles of roads and streets, of which 301 are state highways, 1,330 are county roads, and the rest city streets (Alan M. Voorhies & Assoc., Inc., 1975). Transportation services and the circulation pattern in the study area are described in the Public Services and Facilities section.

Harbors. The harbors at Monterey and Moss Landing have both commercial and recreation fleets, with more commercial than recreation craft. Commercial fleets are expected to remain the same size or decline while there will be more pleasure craft (Monterey County Transportation Study, 1973). In 1975, Monterey Harbor had 405 berths and Moss Landing 400.

Military. Fort Ord, a major installation of the U.S. Army, is in the study area, and occupies 28,700 acres. The base is being changed from a training facility to a division headquarters, and residential housing will soon be added at the rate of 350 units a year, with a final total of 1,000 new units and a base population not exceeding 25,000 by 1995. (Because of changing military requirements, population predictions may also change.)

Other military facilities are the Presidio and the Naval Postgraduate School at Monterey. The Army's Defense Language Institute is at the Presidio.

Urban. Population of the study area is now about 193,000. Even though agriculture is the basis of the economy, urbanization is increasing.

URBANIZATION TREND IN STUDY AREA

	% of Population in Cities	# of Cities
1950	46	3
1960	56	5
1970	73	6
1975	84	7

Source: U. S. Census of Population: 1950, 1960, 1970;
State of California, Department of Finance
Population Estimates, 1975.

In the 1970 census, Seaside-Monterey had become an "urbanized area" with a population of 93,553. By adding the 1970 population of Salinas, the urban population of the study area was about 152,500, or over 80 percent of the total population. Figure 9 is a map of the Seaside-Monterey and Salinas urbanized area as of the 1970 census.

Though there has been a gradual conversion of agricultural land to urban use, the amount of land under cultivation has not declined; marginal land is constantly being added to the cultivated acreage, and agricultural production has increased, as already reported.

Land use changes between 1970 and 1974 were tabulated by the Monterey County Transportation Study. This work, as summarized in the Basis of Planning Report (Engineering Science, Inc., 1975), indicates that much new residential development was taking place on land classified as "vacant" suggesting that residential development is taking place predominantly in undeveloped areas rather than as infill in areas in which a pattern of residential use has already been established. This interpretation must be qualified, however, because it is not known whether small vacant lots were counted into the total vacant category in urban areas. "Vacant" in the MCTS breakdown includes undeveloped land both inside and outside of urban areas.

Table 1 gives acreage by land use categories in civil jurisdictions of the study area, showing the variations in different communities.

Annexations as well as residential, commercial and industrial development are anticipated in the project study area in the future. However, the current moratorium on water connections in Seaside, Monterey and Pacific Grove has affected development in these areas. Marina (which has a population of about 10,500 in the settled part) has a moratorium on new sewer connections which will not be lifted until the current sewer treatment expansion program is completed.

Flood Hazard. A problem affecting current land use in the study area is flooding. Even after the construction of three major dams, there was serious flooding along the entire Salinas River in February 1969. There is periodic flooding along the lower river floodplain and the river's eastern tributaries. Figure 12, prepared by Engineering Science, Inc. from U. S. Geological Survey maps, outlines the 100-year flood area (the area expected to be flooded by high flow volumes likely to occur only once in 100 years).

The U. S. Army Corps of Engineers is now re-evaluating data to better understand the flood problem. Table 5 in the Surface Water Quantity and Quality section lists average and maximum monthly flows for the Salinas River at Spreckels.

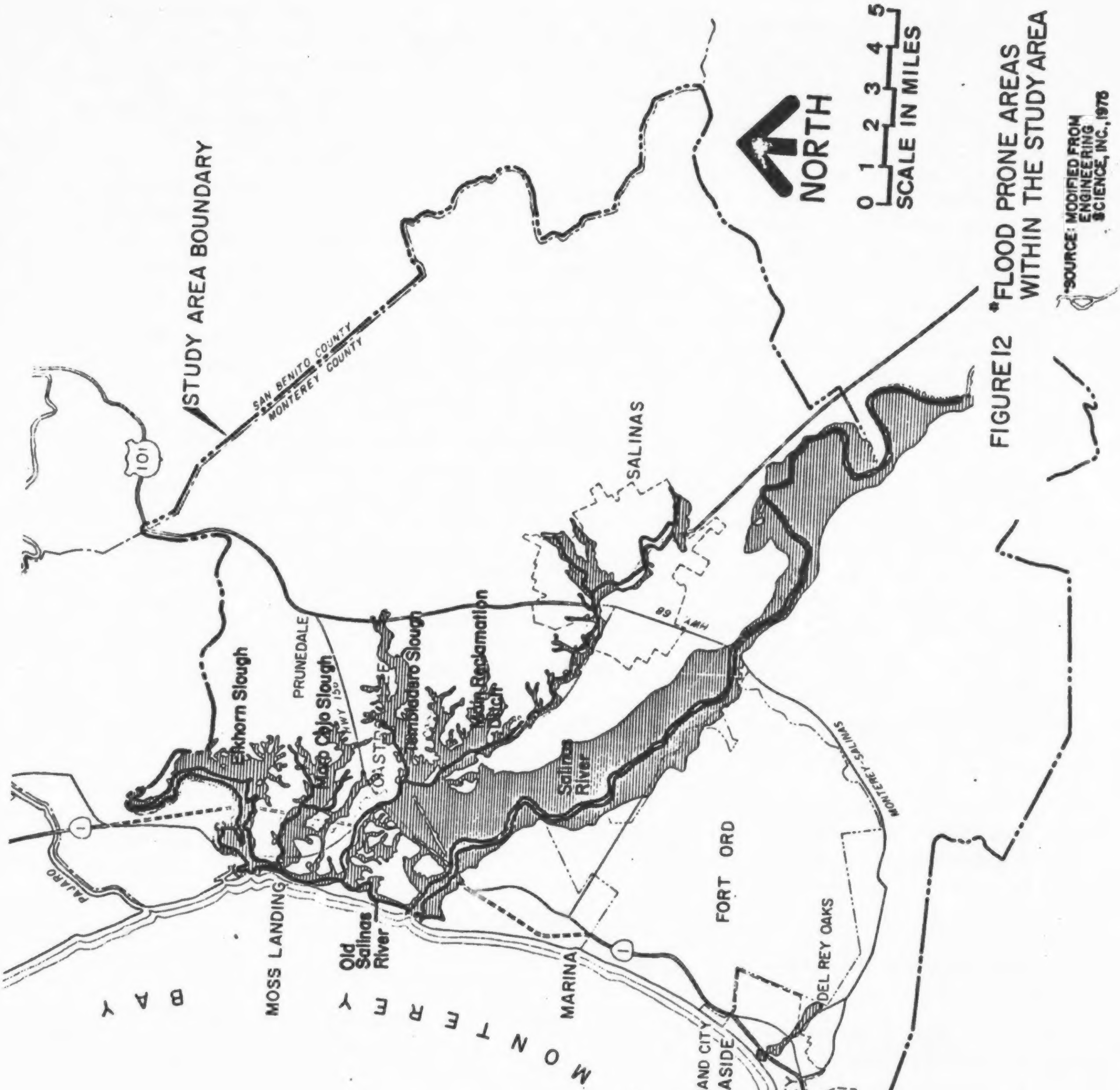

STUDY AREA BOUNDARY
SAN BENITO COUNTY
MONTEREY COUNTY
101
SALINAS
HWY 68
Elkhorn Slough
PRUNEDALE
Moro Cojo Slough
HWY 156
CASTROVILLE
Tembladero Slough
Main Reclamation Ditch
Salinas River
FORT ORD
MONTEREY-SALINAS
DEL REY OAKS
1
PAJARO
MOSS LANDING
Old Salinas River
MARINA
SAND CITY
SEASIDE
MONTEREY
PACIFIC GROVE
CARMEL
MONTEREY BAY
NORTH
0 1 2 3 4 5
SCALE IN MILES

FIGURE 12 *FLOOD PRONE AREAS WITHIN THE STUDY AREA

*SOURCE: MODIFIED FROM ENGINEERING SCIENCE, INC., 1978

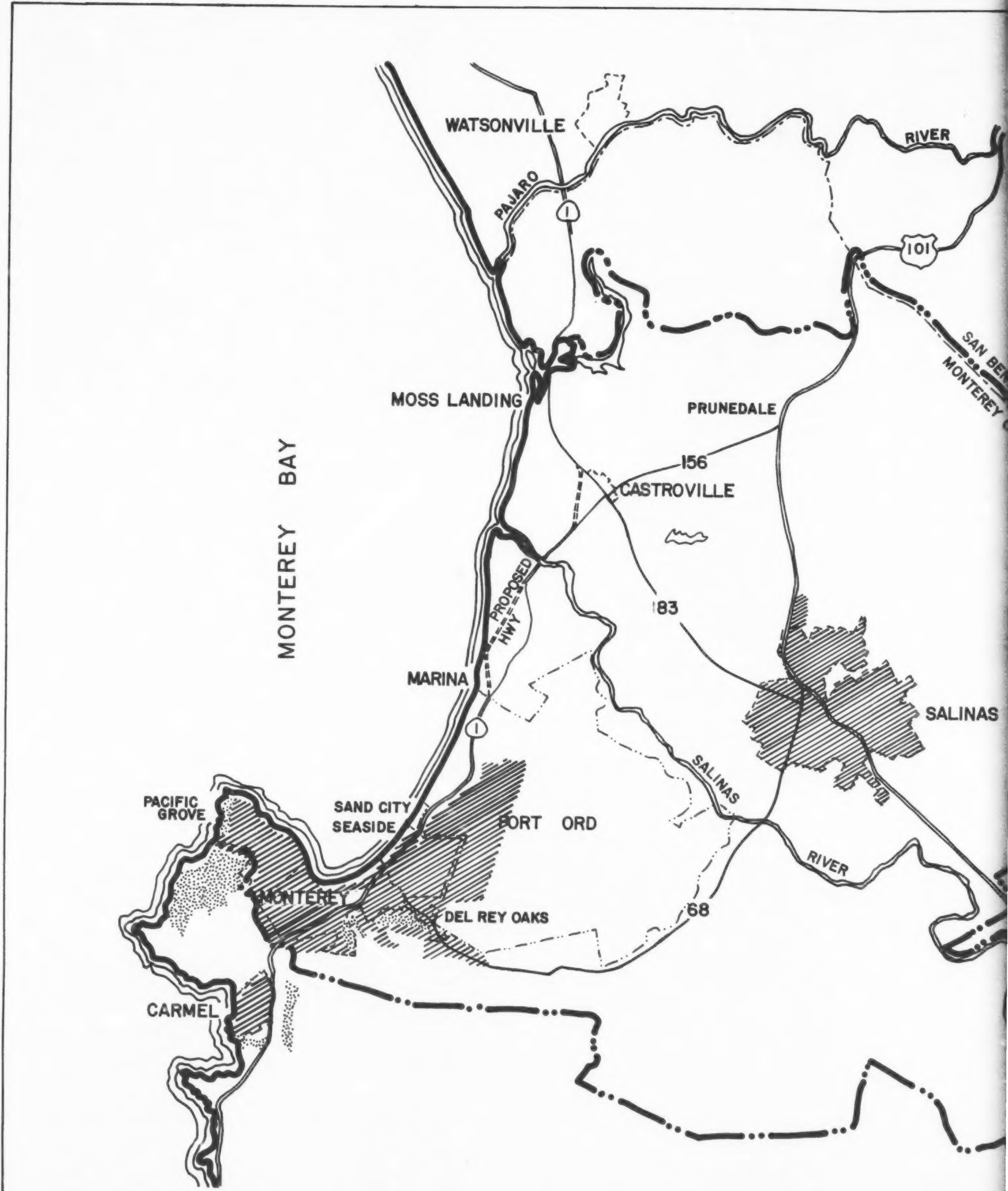
Three county-designated flood districts overlay established zoning in unincorporated areas and regulate land use in flood-prone areas. Proposed land use changes in these county flood districts are reviewed by the County Planning Commission with the help of the Monterey County Flood Control and Water Conservation District to determine the appropriateness of the use. Construction within the primary floodplain is limited to: 1) agriculture, or 2) other uses permitted by the zoning designation which is combined with the floodplain district, assuming the property within the floodplain district is protected by man-made dikes or levees. Development within the secondary floodplain district is restricted to agriculture, recreational use or other uses permitted by the overlying zoning as long as habitable floor levels of structures are above flood profile level or the structures are protected by man-made levees or dikes.

The unincorporated sections of the study area are not currently enrolled in a federal flood control program. The Federal Insurance Administration must first certify detailed flood hazard mapping of the area so that flood insurance availability and rates can be determined. The county must then submit their floodplain development control procedures in order to be part of a federal flood control program. Once the mapping is approved, federal financing of development within the flood hazard area can be withheld until the county is enrolled in an approved flood control program. Until the detailed mapping is complete, however, there are no federal sanctions on development in flood hazard areas. The detailed mapping will not be completed until late 1979 or early 1980.

The incorporated Cities of Monterey, Pacific Grove, Seaside and Salinas are presently participating in federally-approved flood control programs; Sand City, Del Rey Oaks and Marina are not.

Land Use Planning

The Planning Context. Planning is done by many levels of government and carried out by a variety of agencies with specific responsibilities. Several planning bodies in the study area are regional. The Association of Monterey Bay Area Governments (AMBAG) was originally formed to arrive at a comprehensive regional water quality management plan. See page 339 for an explanation of AMBAG's current planning responsibilities relating to water quality control in the study area. Similarly, the Salinas-Monterey Area Transportation Study (SMATS) answered the need for interjurisdictional transportation planning; this agency was succeeded by one covering the entire county, the Monterey County Transportation Study (MCTS). The Monterey Peninsula Water


WATSONVILLE
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MONTEREY
MOSS LANDING
PRUNEDALE
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CASTROVILLE
MONTEREY BAY
PROPOSED HWY
183
MARINA
SALINAS
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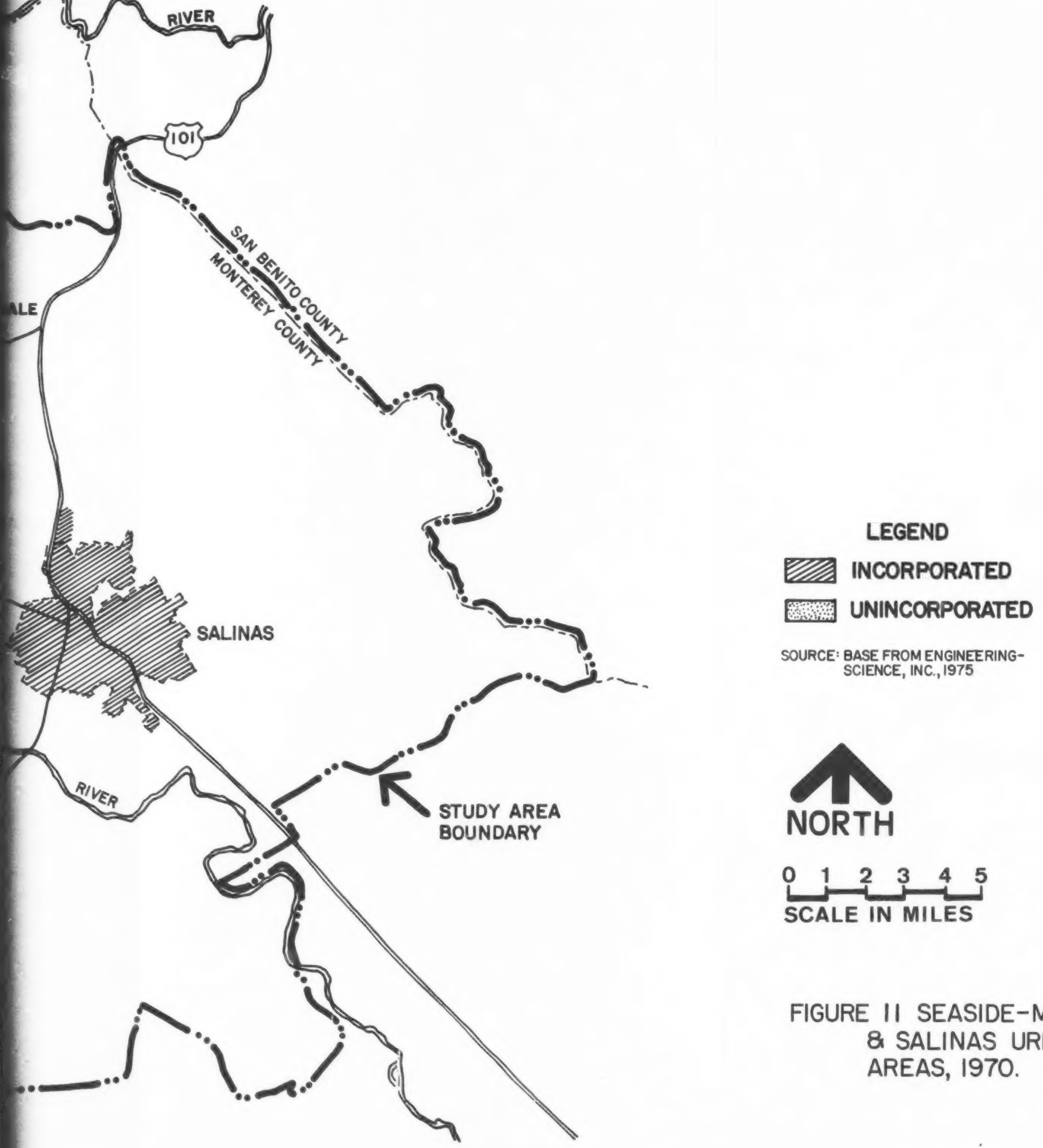
SALINAS
RIVER
PACIFIC GROVE
SAND CITY
SEASIDE
FORT ORD
MONTEREY
DEL REY OAKS
68
CARMEL


RIVER
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SAN BENITO COUNTY
MONTEREY COUNTY
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SALINAS
RIVER
STUDY AREA BOUNDARY
LEGEND
▨ INCORPORATED
▒ UNINCORPORATED
NORTH
0 1 2 3 4 5
SCALE IN MILES

SOURCE: BASE FROM ENGINEERING-SCIENCE, INC., 1975

FIGURE 11 SEASIDE-MONTEREY & SALINAS URBANIZED AREAS, 1970.

Pollution Control Agency (whose members are Monterey, Pacific Grove, Salinas, Monterey County, and the Seaside County Sanitation District) acts as a subregional planning and implementation agency for wastewater districts. Finally, the Coastal Zone Conservation Commission, whose plan was submitted to the state legislature on December 1, 1975 (parts of the plan were subsequently incorporated into the California Coastal Act of 1976), is the body with the broadest jurisdiction in the study area. A description of the Commission's impact upon planning in the study area appears in the Legal, Regulatory and Institutional Constraints section.

Local Plans. State law requires each local general purpose government to prepare a comprehensive plan which must include specific "elements" such as land use, housing, and seismic safety. Capital improvement programs and local zoning implement such plans.

Monterey County. The General Plan of Monterey County, approved in 1968, established guidelines for growth, future land use, and elements for circulation, conservation, open space, ocean resources, public facilities, and economic activity. Emphasis is placed upon protecting the shoreline and providing access to it by carefully controlling development along the oceanfront and encouraging public acquisition of waterfront acreage.

City of Monterey. Planning in Monterey began early in the century. The city is currently revising its general plan. A major concern is to control growth by reviewing development proposals for overall impact. The city will continue to encourage new clean industry. (Fell, pers. comm.)

Pacific Grove. Pacific Grove formed its first planning commission in 1929. Its General Plan emerged in 1973. Pacific Grove expects to keep its residential character, with limited commercial activity for residents and visitors. Industrial development will be discouraged.

Salinas. Salinas began municipal planning in 1924. Changing attitudes toward future growth have made revision of the general plan necessary. Seven interim policies were articulated in 1973; they show a desire to limit sprawl and revitalize the downtown area.

Seaside. Seaside incorporated in 1954 in order to have more control over community development. Its general plan, now being revised to conform with state guidelines, includes a social element, a community facilities element, and a social service element (Burris, pers. comm.).

Marina. Marina voted to become a city in November 1975. The city has just begun working on a general plan. Goals and policies have yet to be articulated.

Castroville. Although Castroville is an old community it has not yet incorporated. It was not included in the precise zoning districts of the county zoning ordinance, and had no comprehensive plan until it was covered by interim county plans in 1956 and 1964. In 1973 the county, with the help of a citizen committee, produced the Castroville General Plan. The plan states that future growth should take such form as not to encroach upon prime agricultural land. The plan also emphasizes that the "preservation and retention of all existing sloughs, beaches and coastline is essential for the conservation of valuable fish and wildlife habitat".

Moss Landing. Moss Landing was included in the two interim plans mentioned above, and is now covered by a regional element of the County General Plan. The goals of the element outline a desire to preserve and protect the "prime and productive agricultural lands of the planning area". The element states that the shoreline should be protected and access to it provided and also stresses that "conservation of the Elkhorn Slough as a wildlife and estuarine resource is highly desirable".

Planning is discussed further in the Site Specific Environment section.

Air Resources

Meteorology. Typically, the Monterey Bay area has warm, dry summers and cool, rainy winters. The Pacific Ocean moderates extreme temperatures along the coast, but this influence diminishes inland, especially where mountains form a barrier to on-shore ocean breezes.

During the summer months when the North Pacific high pressure cell is located almost due west of Monterey, days are generally warm, sunny and dry. Coastal morning and evening fog is occasionally drawn up the Salinas Valley, but inland areas are usually clear and warm. Average July and August temperatures in Salinas are around 63°F, while on the coast at Monterey they remain close to 60°F (Engineering Science, Inc., 1975). Precipitation in these months is usually less than 0.1 inch.

During the fall, the oceanic high pressure cell begins to shift southward and on-shore breezes decline. This reduces the influx of fog and the area has warm, pleasant weather. As the high pressure cell shifts farther south, cyclonic storms from the Aleutian low pressure region begin to pass over northern California, bringing rain and gusty west winds. Average temperatures drop to the middle and low 50's (°F) during the winter. Ninety percent of the area's rainfall occurs between November 1 and April 30 (average annual rainfall is 18.5 inches in Monterey and 13.7 inches in Salinas). The warming effect of the Pacific Ocean maintains temperatures above freezing except for a few days each winter, when Arctic air invades California.

In March and April, the cool, wet days are interrupted by occasional warm, sunny days. The Pacific high begins to move north again and blustery west winds are frequent. May and June bring a return to warm sunny days and the return of summer coastal fog.

Local topography has a strong influence on precipitation. Rain falls on the western and southern slopes of the coastal hills. Leeward mountain slopes and the interior valleys (i.e., Salinas Valley) have considerably less rain. A table of average monthly temperatures and precipitation is in Appendix B.

The general wind pattern includes predominantly west and northwest winds averaging 4-8 mph in the spring and summer, with more variable breezes of 4-6 mph in the late fall and winter. Data collected at the Monterey-Salinas Airport just east of Monterey from 1949 to 1969 shows west and northwest winds blow in this area from March to October, with highest average wind speeds recorded in March, April and May (8.1 mph is the highest mean wind speed). From November through February winds from the southwest and southeast become common, reflecting the frequent passage of cyclonic storms moving from west to east across the state (Renaud, pers. comm.).

In the Salinas area, the natural configuration and orientation of the valley influences the wind pattern. Yearly average wind speed and direction data compiled by the National Weather Service show northwest (up-valley) and southeast (down-valley) winds are the most frequent at Salinas, with highest average wind speeds coming from the southeast at 11.1 mph

(Abercrombie, pers. comm.). The 3,000-foot mountain barrier on either side of the valley (created by the Sierra de Salinas and the Gabilan Range) act in concert with low inversion heights to prevent the direct inflow of marine air except through the valley opening onto Monterey Bay. The result is a pronounced channelization of winds. In the Paso Robles area, winds are light to variable 29 to 55 percent of the time. This, coupled with relatively low nighttime inversion conditions, tends to encourage the accumulation of air pollution in the southern part of the Salinas Valley (Stanford Research Institute, 1958). Annual wind speed and direction data for Monterey, Salinas, Paso Robles and Hollister are shown in Appendix B.

Air Quality. The air quality of an area is affected by the types and amounts of pollutants emitted into the atmosphere, physical processes (meteorology) affecting the distribution of these pollutants, and chemical reactions involving pollutants and substances naturally present in the atmosphere. Appendix A-1 provides a background discussion of air pollution terminology, meteorological and chemical processes important to an understanding of air pollution, and the various types of effects produced by air pollutants.

Air Quality Management. Air quality management responsibilities exist at local, state and federal levels of government. State legislation enacted in 1947 authorized each county to form a local air pollution control district. In 1970, legislation was enacted which made it mandatory for each county to be within such a district. Local air pollution control districts have primary responsibility for the control of stationary sources of air pollution. Local air pollution control district regulations establish limitations on the quantities of air pollutants which may be emitted by various types of pollution sources. In addition, air pollution control districts have permit authority over the construction and operation of new stationary sources of air pollution. Permits for such new sources can be denied if emissions from that source would either exceed local emissions limitations or result in violation of any ambient air quality standard.

Control of mobile sources of air pollution is exercised at state and federal levels. The California Air Resources Board (ARB) and its predecessor agencies have required a series of emission control devices on vehicles sold in California.

Statewide ambient air quality standards were first authorized in 1959. The 1967 Mulford-Carrel Act, which created the California Air Resources Board, also authorized the ARB to adopt air quality standards, designate air basins, establish motor vehicle emission standards, monitor air pollutants, and exercise control over stationary sources of air pollution if the local air pollution control district's activities are insufficient to achieve air quality standards.

The California Air Resources Board has divided the state into 14 air basins. The study area is part of the North Central Coast Air Basin, which consists of Santa Cruz, Monterey and San Benito Counties. While air pollution problems are recognized in this air basin, they are significantly less serious than those found in most of the more populous basins in the state. The three counties which comprise the North Central Coast Air Basin have recently merged their air pollution control functions in the Monterey Bay Unified Air Pollution Control District.

Federal ambient air quality standards were first authorized by the Clean Air Act amendments of 1970. State ambient air quality standards take precedence over the federal standards only in cases where the state standards are more stringent.

Table 2 presents ambient air quality standards which have been adopted by the California Air Resources Board and the U. S. Environmental Protection Agency. These standards are based on numerous studies of the health-related and other effects of air pollutants. Two sets of federal standards have been adopted. The "primary standards" identify ambient air quality levels necessary to protect public health "with an adequate margin of safety". The "secondary standards" identify ambient air quality levels necessary to protect "public welfare", such as prevention of air pollution damage to crops, natural vegetation, materials and structures. The adopted state and federal air quality standards are based on available research regarding the effects of various levels of each pollutant. The federal standards, for example, are based largely on data summarized in the Air Quality Criteria documents published by the U. S. Department of Health, Education and Welfare in 1969 and 1970. The adequacy or necessity for these standards has been the subject of substantial controversy. A recent evaluation of the federal primary ambient air quality standards by the National Academy of Sciences for the U. S. Senate concludes:

Table 2

AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3, 5]	Secondary[3, 6]	Method[7]
Oxidant (Ozone)	1 hour	0.10 ppm (200 ug/m^3)	Ultraviolet Photometry	160 ug/m^3 (0.08 ppm)	Same as Primary Std.	Chemiluminescent Method
Carbon Monoxide	12 hour	10 ppm (11 mg/m^3)	Non-Dispersive Infrared Spectroscopy	–	Same as Primary Standards	Non-Dispersive Infrared Spectroscopy
	8 hour	–		10 mg/m^3 (9 ppm)		
	1 hour	40 ppm (46 mg/m^3)		40 mg/m^3 (35 ppm)		
Nitrogen Dioxide	Annual Average	–	Saltzman Method	100 ug/m^3 (0.05 ppm)	Same as Primary Standards	Proposed: Modified J-H Saltzman (O_3 corr.) Chemiluminescent
	1 hour	0.25 ppm (470 ug/m^3)		–		
Sulfur Dioxide	Annual Average	–	Conductimetric Method	80 ug/m^3 (0.03 ppm)	–	Pararosaniline Method
	24 hour	0.04 ppm (105 ug/m^3)		365 ug/m^3 (0.14 ppm)	–	
	3 hour	–		–	1300 ug/m^3 (0.5 ppm)	
	1 hour	0.5 ppm (1310 ug/m^3)		–	–	
Suspended Particulate Matter	Annual Geometric Mean	60 ug/m^3	High Volume Sampling	75 ug/m^3	60 ug/m^3	High Volume Sampling
	24 hour	100 ug/m^3		260 ug/m^3	150 ug/m^3	
Sulfates	24 hour	25 ug/m^3	AIHL Method No. 61	–	–	–
Lead	30 Day Average	1.5 ug/m^3	AIHL Method No. 54	–	–	–
Hydrogen Sulfide	1 hour	0.03 ppm (42 ug/m^3)	Cadnium Hydroxide Stractan Method	–	–	–
Hydrocarbons (Corrected for Methane)	3 hour (6-9 a.m.)	–	–	160 ug/m^3 (0.24 ppm)	Same as Primary Standards	Flame Ionization Detection Using Gas Chromatography
Ethylene	8 hour	0.1 ppm	–	–	–	–
	1 hour	0.5 ppm				
Visibility Reducing Particles	1 observation	In sufficient amount to (8) reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70%		–	–	–

NOTES:

1. California standards are values that are not to be equaled or exceeded.
2. National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of Hg (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent procedure which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the Environmental Protection Agency (EPA).
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after implementation plan is approved by the EPA.
7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
8. Prevailing visibility is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

Source: Air Resources Board, 1976.

> "Due to the limitations of present knowledge, it is impossible at this time to establish an ambient air concentration of any pollutant — other than zero — below which it is certain that no human beings will be adversely affected.
>
> "Present knowledge of health effects appears to afford no compelling basis for suggestions to either raise or lower the currently mandated primary air quality standards at this time.
>
> "The present standards rest upon the best judgments which could be made of effects observed under far from ideal observing or experimental conditions. The impressions gained from the collective presentations and attitudes of those who participated in the conference is that, from the standpoint of health considerations, it would be prudent to retain the present standards until a substantial body of research provides much better evidence than any currently available to indicate that the primary air quality standards should be either relaxed or made more stringent. This conservative view is fostered by emerging data that suggest that observed adverse health effects may arise in considerable part not only from interactions of body tissues with the primary pollutants but with unidentified reaction products generated by complex chemical events in the atmosphere or indeed within the lung." (National Academy of Sciences, 1973)

The 1970 amendments to the federal Clean Air Act transferred the air pollution control activities of the federal government to the Environmental Protection Agency (EPA). The Clean Air Act authorized EPA to establish national air quality standards, to establish emission standards for various stationary and mobile sources of pollutants, and to require all states to develop and adopt plans (implementation plans) to achieve and maintain these standards by July of 1975. The Clean Air Act contained provisions allowing EPA to grant time extensions of up to 2 years for the attainment of selected air quality standards in specific regions. No such time extensions were applied to the North Central Coast Air Basin. EPA guidelines require that state implementation plans must provide for emission limitations; land use and transportation controls; source monitoring; ambient air quality monitoring; inter-governmental cooperation; and a procedure for review and approval of new sources of air pollution prior to construction. EPA has the authority to approve or disapprove these plans, and to promulgate an acceptable plan if the submitted plan is disapproved.

California's implementation plan (California Air Resources Board, 1972) was submitted in 1972. Since that time, five major revisions have been adopted by ARB and submitted to EPA. Portions of California's implementation plan have failed to receive EPA approval. The issues in question involve the failure of the California plan to demonstrate a means of achieving the national air quality standards in all air basins by the adopted attainment deadlines; failure to provide for maintenance of air quality in "clean air areas" or in other areas once the standards are attained; and a failure to incorporate adequate land use and transportation control measures.

Revision 5 to the California Implementation Plan (California Air Resources Board, 1974f) recommended that EPA designate Monterey County as an air quality maintenance area with respect to photochemical oxidants. Air quality maintenance areas are those areas which either a) currently exceed one or more national air quality standards and are not expected to achieve the national standard by 1980; or b) currently meet all national air quality standards but are expected to exceed one or more standards by 1985. Such a designation requires that detailed projections of future pollutant levels be prepared for each area designated as an air quality maintenance area. If this analysis confirms that a national air quality standard will not be maintained through 1985 or achieved by 1980, development of a long-term maintenance plan may be required to assure the earliest feasible achievement and subsequent maintenance of the air quality standards of concern.

Subsequent to publication of Revision 5 to the California Implementation Plan, new procedures for monitoring oxidant levels were adopted by the California Air Resources Board (Appendix A-2). These new procedures produce readings about 20 percent lower than those produced by the previous ARB methodology. In addition, the Monterey Bay Unified Air Pollution Control District presented ARB with revised information on current and historical hydrocarbon emissions, and a program for significantly reducing these emissions. On the basis of this information, ARB withdrew its recommendation that Monterey County be designated an Air Quality Maintenance Area. Both ARB and EPA are continuing to evaluate the current and expected air quality conditions in Monterey County. The county could be designated as an AQMA if warranted by this ongoing evaluation.

In September 1976, ARB released a report outlining a proposal to establish an Air Conservation Program in California (California Air Resources Board, 1976d). This program is designed to meet EPA "no significant deterioration" regulations for existing "clean air areas" as well as state legislative mandates to protect and enhance air quality throughout the state. The program as outlined in preliminary form would classify all areas of the state into one of four categories: areas in which no deterioration of existing superior air quality would be allowed; areas where a certain amount of deterioration from existing air quality levels would be allowed, but which would maintain air quality superior to existing health-related standards; areas in which air quality standards to protect agricultural productivity would be met; and areas where existing health-related standards are adequate as air quality goals. The details of such an air conservation program are expected to be developed during the next two years.

Present Air Quality of the Study Area. Table 3 shows the frequency with which state and federal standards for oxidants have been exceeded at monitoring stations in the district, and Table 4 shows unacceptable particulate levels. Carbon monoxide, nitrogen dioxide and sulfur dioxide measurements have not exceeded state or federal standards. Appendix A-4 provides more detailed data on ambient air quality measurements in the North Central Coast Air Basin. In general, oxidant levels in the basin reach periodic high levels between March and October (Figure 13). Periodic high levels for carbon monoxide, nitrogen oxides, hydrocarbons, and lead particulates occur from September through February. No seasonal trend is evident for suspended particulates.

Appendix A-3 provides data on the quantities of air pollutants emitted by various stationary and mobile sources within the district in recent years. The major increase between 1973 and 1974 in organic compound emissions from petroleum production in Monterey County reflects a more accurate estimate of emissions from this source, not an actual increase in emissions (Monterey Bay Unified Air Pollution Control District, 1975). These emissions, due to steam injection procedures at the San Ardo oil fields, are being eliminated by new control procedures. The recent recognition of this hydrocarbon source and the anticipated effectiveness of available control techniques were major factors in the decision by ARB not to recommend the AQMA designation for Monterey County at this time.

In summary, depending on the prevalent weather conditions of any given year, the study area experiences minor to moderate air quality problems. The quality is significantly better than the major urban areas of California (Los Angeles basin and San Francisco Bay area), but worse than that of the more rural counties in the state.

Table 3

DAYS EXCEEDING FEDERAL AND STATE 1-HOUR OXIDANT STANDARDS*

Station	Year	Days of Data	Days Exceeding National Primary Standard	Days Exceeding California Standard
Carmel	1973	85	5	0
	1974	264	1	1
Gonzales	1970	248	2	0
	1971	353	6	2
	1972	337	5	3
	1973	331	6	5
	1974	359	1	0
Hollister	1973	244	16	2
	1974	143	4	1
Monterey	1970	260	0	0
	1971	249	1	1
	1972	240	1	0
	1973	351	7	4
	1974	351	1	1
Salinas	1970	343	1	0
	1971	354	0	0
	1972	358	0	0
	1973	356	6	3
	1974	350	2	0
Santa Cruz	1970	364	0	0
	1971	353	2	1
	1972	364	0	0
	1973	363	2	0
	1974	360	1	0
Watsonville	1972	178	6	0
	1973	91	0	0

* Corrected from data originally recorded on instruments calibrated with neutral buffered potassium iodide reagents. Equivalent to data from instruments calibrated by ultraviolet photometry (see (Appendix A-2).

Source: California Air Resources Board, 1970-1975.

Table 4

PARTICULATE 24-HOUR AVERAGES EXCEEDING STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS

	Percent of Values 100 $\mu g/m^3$ or More (State Standard)					
	1970	1971	1972	1973	1974	5-Year Average
Hollister	--	--	--	--	0	--
Gonzales	27	25	18	19	0	18
Salinas	26	25	23	35	28	27
Salinas #2*	--	--	--	--	0	--
Monterey	0	0	0	0	0	0
Santa Cruz	5	0	0	10	10	5
Watsonville	--	--	0	21	7	9

	Percent of Values Exceeding 150 $\mu g/m^3$ (Federal Secondary Standard)					
	1970	1971	1972	1973	1974	5-Year Average
Hollister	--	--	--	--	0	--
Gonzales	0	8	4	3	0	3
Salinas	0	5	5	22	2	7
Salinas #2*	--	--	--	--	0	--
Monterey	0	0	0	0	0	0
Santa Cruz	0	0	0	0	0	0
Watsonville	--	--	0	3	0	1

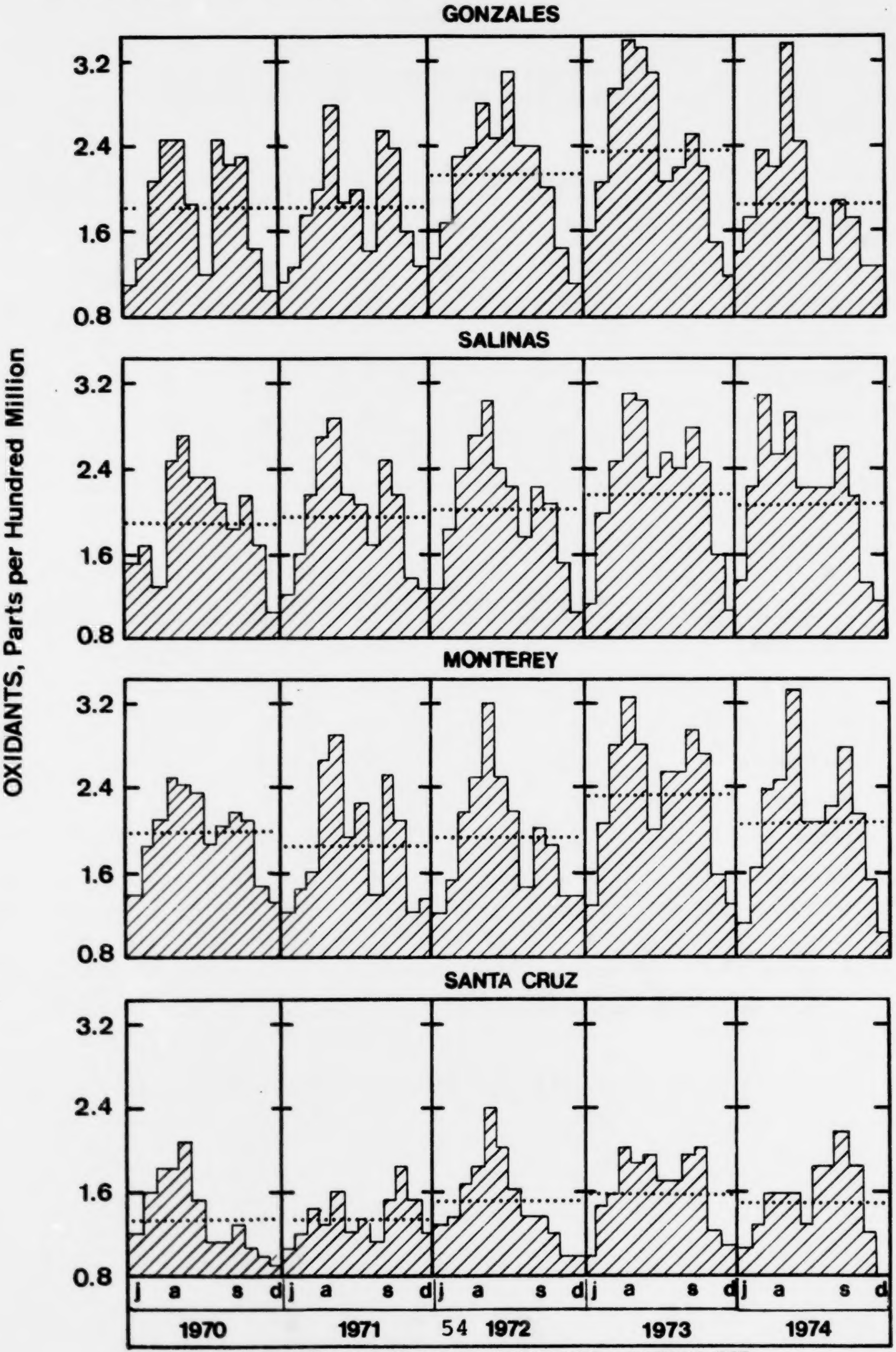
* Salinas #2 - 1270 Natividad Road, Salinas is site of District Office and Monitoring Station in late 1975. Data through July 1974 not reported because high numbers reflected dirty conditions from local highway and building construction.

Source: Monterey Bay Unified Air Pollution Control District, 1975.

OXIDANT Monthly and Annual Average

Figure 13

(Note: Data corrected for recent change in instrument calibration procedures, see Appendix A2 — air quality standards apply to single hour events, not monthly or annual averages)



SOURCE: MONTEREY BAY UNIFIED AIR POLLUTION CONTROL DISTRICT, 1975.

Water Resources

Introduction. The study area's water courses and bodies of water are many and have complex interrelationships. Water information, to be useful to specialists, must be given in a technical vocabulary. A simple digest of the study area's major water features, and a glossary that includes the technical terminology (in the back of the report) therefore seems in order.

There are large seasonal fluctuations in local water flows. Heavy rainfall in the winter increases water quantity, and, generally speaking, improves water quality as pollutants are less concentrated in the larger volumes of runoff. Seasonal fluctuation is especially marked in the Salinas River, for by far the greater part of its flow is subterranean (i.e., flowing underground). During the rainy season inflows to the channel are sufficient to provide considerable surface flow. Some of the subterranean water is drawn up for irrigation and domestic use, but most water flows underground into Monterey Bay.

Domestic waste disposal and agricultural runoff (from irrigation) are the two chief offenders in lowering surface water quality, making study area waters unsuitable in varying degrees for various uses, as is set forth in the following pages.

The three principal groundwater aquifers in the Salinas Valley also fluctuate with the seasons. Heavy agricultural and domestic use of the underground supplies accentuate the fluctuation in the summer months. Groundwater drawdown has become so severe in the lower Salinas Valley that seawater is intruding inland, increasing the *salinity* of groundwater in some areas to the point that it is not fit for domestic or agricultural use.

Surface Water -- Quantity and Quality. The principal surface waters of the study area are the lower Salinas River and its tributaries; Elkhorn, Tembladero, and Moro Cojo Sloughs; Old Salinas River; the Blanco Drain, and the Main Reclamation Ditch (see Figure 14). The U. S. Geological Survey, the California Department of Water Resources and the Monterey County Flood Control and Water Conservation District are the principal sources of water quality and quantity data in the area. The Flood Control District operates Nacimiento and San Antonio Reservoirs, the two principal Salinas River water sources.

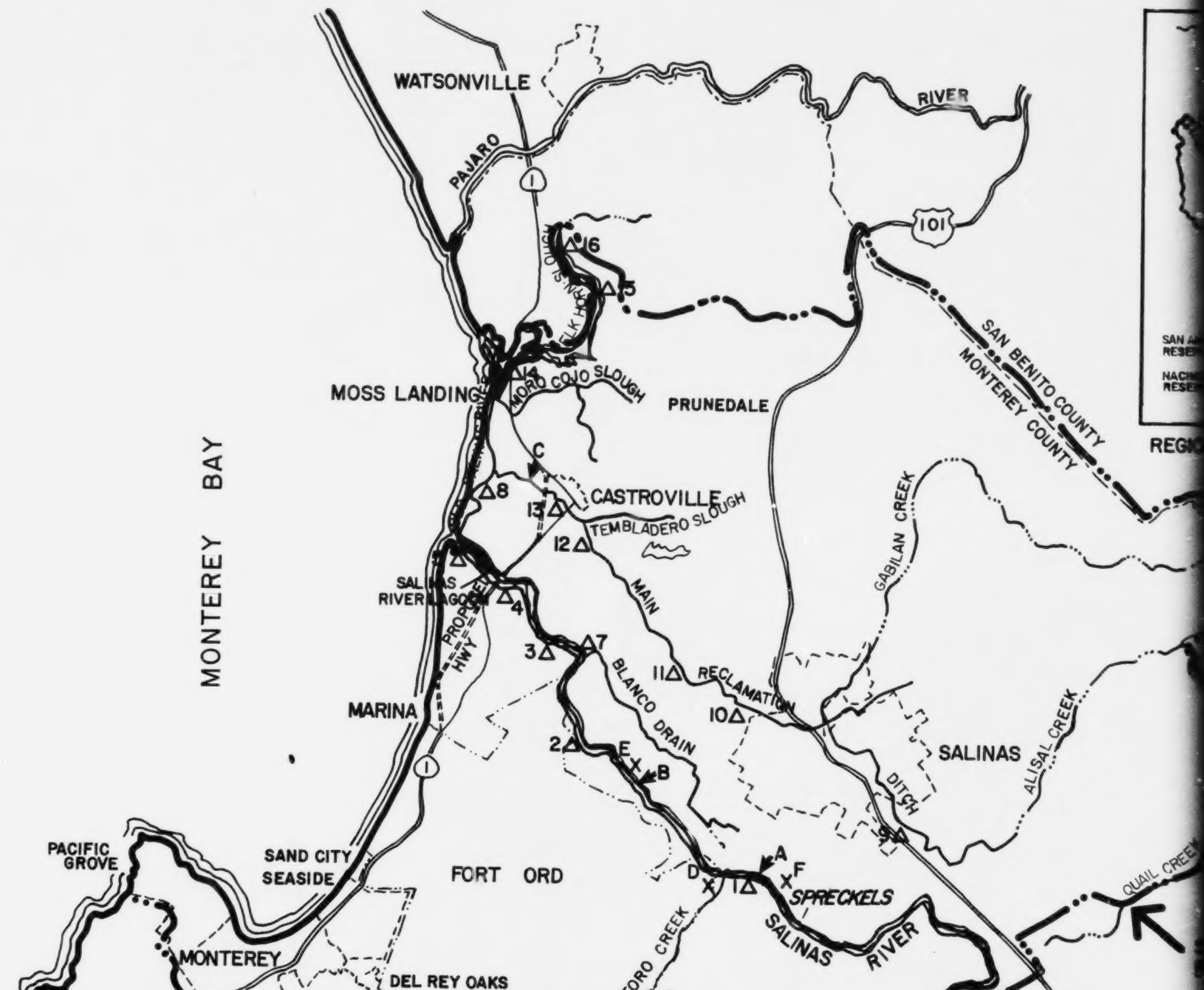
Water quality standards observed in this report are those of the State Water Resources Control Board, the Central Coastal Regional Water Quality Control Board and the Environmental Protection Agency.

Lower Salinas River. The Salinas River is the major surface stream in the study area and is one of the largest streams on the central California coast. The extreme seasonal fluctuations in its surface flow and the large inputs of domestic wastewater and agricultural runoff that reach its lower stretches have combined to create adverse water quality conditions. The relative influence of these several factors affecting water quality is not known; resolution of their influence would require considerable monitoring of hydrologic and chemical conditions in the river below Salinas. High bacterial counts and pesticide levels, and nuisance *algal blooms* are the major water quality problems, especially during the summer months. These conditions limit the recreational use of the stream due to potential health hazards. They also limit the abundance and variety of fish life in the stream and its lagoon.

Variations in flow in the Salinas River just below Spreckels (Table 5 and Figure 15) reflect changed conditions since construction of the Nacimiento Reservoir in 1957 and the San Antonio Reservoir in 1965. The dams reduce normal spring runoff and, during the summer, their releases are percolated to the groundwater or diverted for municipal and agricultural use before reaching Spreckels, eliminating most flow in the lower river (U. S. Geological Survey, 1973). In wet years, some reservoir releases are allowed to flow beyond normal recharge areas in summer and fall (Taylor, pers. comm.), but their relative contribution to late summer flows at Spreckels is not known. Surface flows in the river were being modified significantly by agricultural diversions prior to construction of the reservoirs, but the dams have increased the degree of regulation.

During July and August, surface runoff at the USGS Spreckels gauging station is about 1.5 cubic feet per second (*cfs*; equivalent to one million gallons per day [mgd]) and is primarily wastewater from the Salinas-Alisal sewage plant discharge just upstream. Below Spreckels the main Salinas wastewater treatment plant discharges 5-6 mgd (7.8-9.3 cfs) of effluent into the river channel, significantly augmenting summer flows. Flows decrease below this point until water from the Blanco Drain is pumped into the river bed about 5 miles below the main treatment plant discharge. Summer flows from the Blanco Drain averaged from 3-6 cfs (roughly 2-4 mgd) in 1965 (California Department of Water Resources, 1965). More recent flow data indicate the flow averaged 3.2 cfs (2.1 mgd) in the 6-month period between May 1 and November 1, in the years 1972 to 1974 (modified from data supplied by Binder, pers. comm.).

The beneficial uses assigned to the lower Salinas River (Table N-2) by the RWQCB include fish migration, warmwater fish habitat, wildlife habitat, and non-contact recreation. The recommended water quality standards (Table N-3) for protecting


WATSONVILLE
PAJARO
RIVER
1
101
16
15
ELKHORN SLOUGH
MOSS LANDING
14
MORO COJO SLOUGH
PRUNEDALE
SAN BENITO COUNTY
MONTEREY COUNTY
REGIO
SAN A
RESE
NACIM
RESE
MONTEREY BAY
C
8
CASTROVILLE
13
TEMBLADERO SLOUGH
12
5
SALINAS RIVER LAGOON
4
PROPOSED HWY
GABILAN CREEK
MAIN
3
7
11
RECLAMATION
DITCH
10
BLANCO DRAIN
MARINA
1
2
E
B
SALINAS
ALISAL CREEK
9
QUAIL CREEK
PACIFIC GROVE
SAND CITY
SEASIDE
FORT ORD
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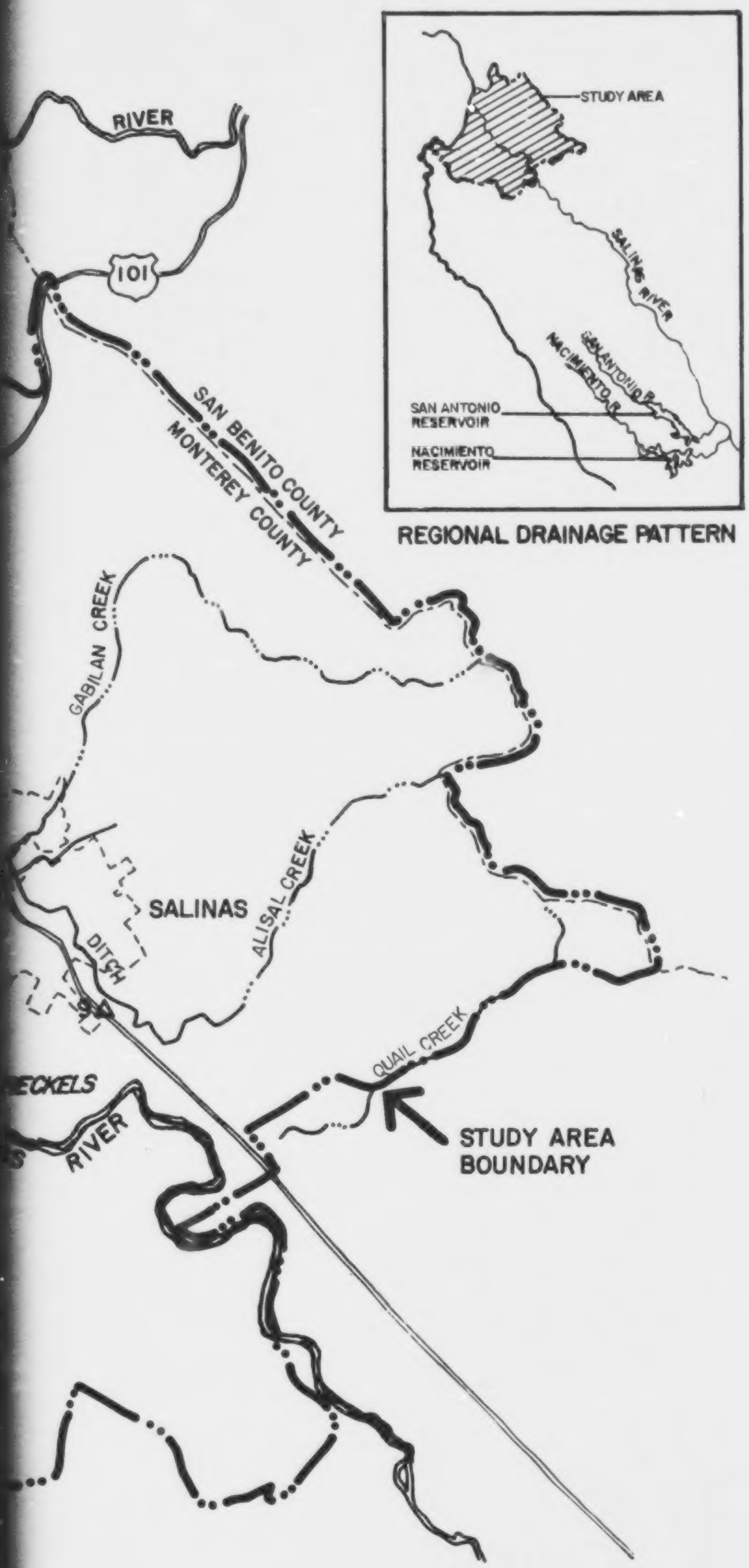
SPRECKELS
SALINAS RIVER
EL TORO CREEK
6
MONTEREY
DEL REY OAKS
CARMEL


STUDY AREA
SALINAS RIVER
SAN ANTONIO R.
NACIMIENTO R.
SAN ANTONIO RESERVOIR
NACIMIENTO RESERVOIR
REGIONAL DRAINAGE PATTERN
RIVER
101
SAN BENITO COUNTY
MONTEREY COUNTY
GABILAN CREEK
ALISAL CREEK
SALINAS
DITCH
9
QUAIL CREEK
ECKELS
RIVER
STUDY AREA BOUNDARY

LEGEND FOR FIGURE

Gauging and Water Quality Sampling Stations

△ 1 - Salinas River - Spreckels gauging station
2 - Salinas River - Blanco Road overcrossing
3 - Salinas River - one mile below Blanco Drain
4 - Salinas River - Highway 1 overcrossing
5 - Salinas River - lagoon
6 - El Toro Creek
7 - Blanco Drain
8 - Old Salinas River above Tembladero Slough
9 - Main Reclamation Ditch - Airport Boulevard
10 - Main Reclamation Ditch - Boronda Road
11 - Main Reclamation Ditch - San Jon Road
12 - Main Reclamation Ditch - Espinoza Road
13 - Tembladero Slough - Highway 1 overcrossing
14 - Elkhorn Slough - Highway 1 overcrossing
15 - Elkhorn Slough at Kirby Park
16 - Elkhorn Slough at Carneros Slough Inlet

Salinas Valley Wastewater Discharges

◄ A - Salinas - Alisal
B - Salinas - Main Plant
C - Castroville CSD

Wastewater Percolation Ponds

X D - Toro Park Estates aeration lagoons
E - Salinas industrial waste treatment ponds
F - Spreckels sugar refinery wastewater ponds

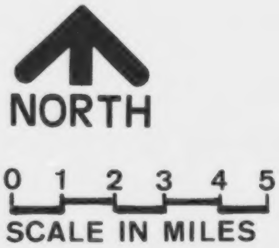

NORTH
0 1 2 3 4 5
SCALE IN MILES

FIGURE 14 REGIONAL & STUDY AREA SURFACE WATER DRAINAGE PATTERNS.

Table 5*

MONTHLY VARIATION OF SURFACE RUNOFF IN SALINAS RIVER

Type of Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Dry (1960-61)													
(cfs)[2]	1.1	2.9	3	1.3	1.1	1.0	.8	1.3	1.2	1.0	0.8	0.8	1.3
in acre-feet	68	178	184	80	61	62	48	80	71	62	49	48	990
Wet (1940-41)													
(cfs)	8.0	12	870	2,886	9,324	8,334	7,191	945	227	44.6	7.2	4.6	2,443
in acre-feet	492	714	53,430	177,200	517,100	514,800	427,300	58,000	13,480	2,740	444	273	1,766,000
Median (1930-57)[3]													
(cfs)	3	7.5	12.0	88.9	393	415	71.4	8.6	2.0	1.3	1	1.4	82
in acre-feet	183	446	738	5,460	21,800	25,500	4,240	526	119	61	61	83	59,220[5]
% of annual runoff	0.3	0.8	1.2	9.2	36.8	43.1	7.2	0.9	0.2	0.1	0.1	0.1	100
Median (1957-70)[4]													
(cfs)	4.5	4.7	17.6	103	361	289	12.7	11.2	3.9	1.5	1.6	3	66
in acre-feet	275	282	1,080	6,330	20,020	17,770	756	689	234	95	96	178	47,800[5]
% of annual runoff	0.6	0.6	2.2	13.2	41.9	37.2	1.6	1.4	0.5	0.2	0.2	0.4	100

57.

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[1] Salinas River below Spreckels. Drainage area - 4,156 square miles. Period of Record - October 1929 to present.

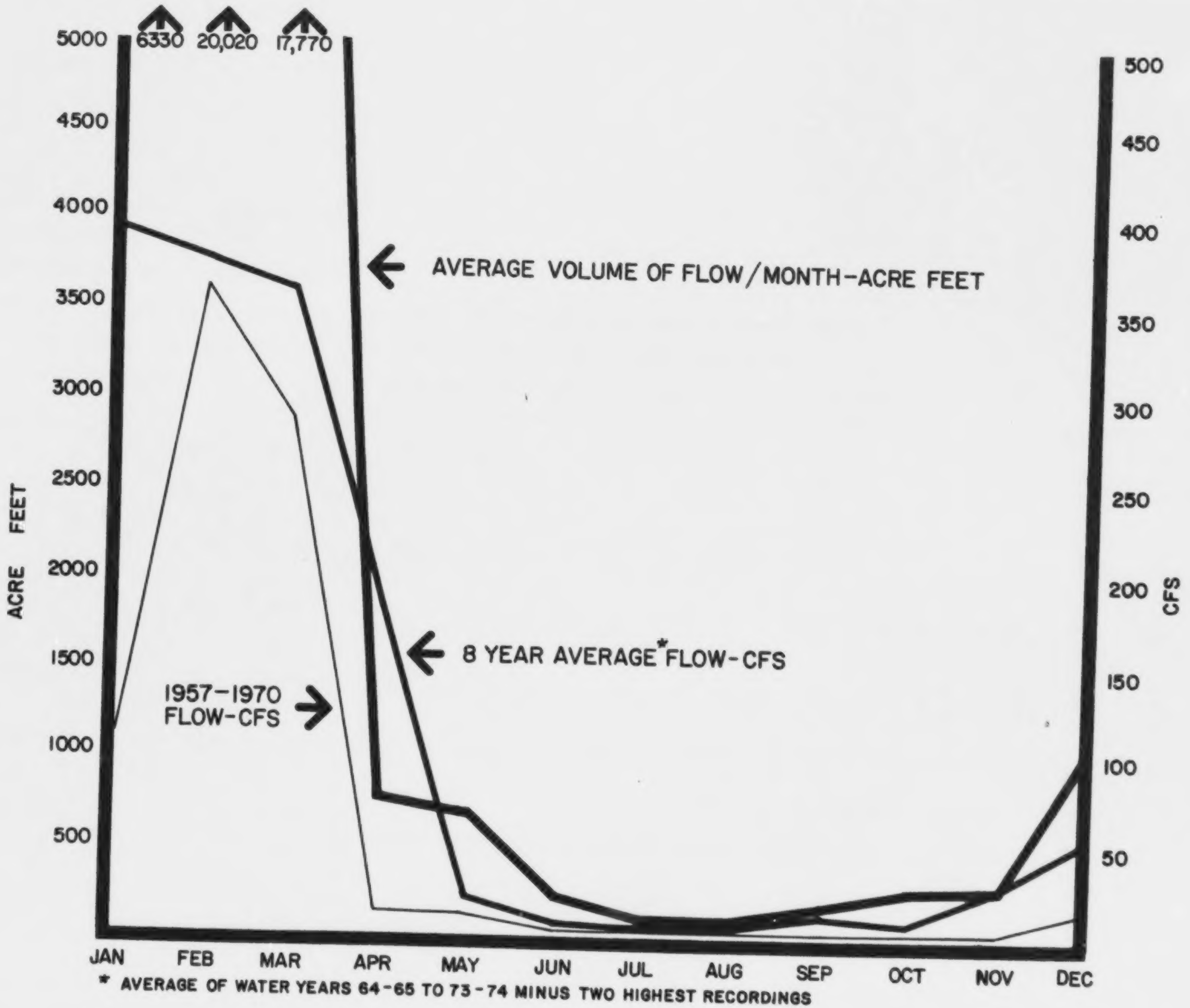
[2] Cfs calculated by Jones & Stokes Associates, Inc., assuming a uniform flow throughout each month.

[3] Median discharge from 1930 to 1957 (27 years). Nacimiento Reservoir regulation began in November 1956.

[4] Median discharge from 1957 to 1970 (13 years).

[5] Sum of monthly medians.

* Source: Yoder-Trotter-Orlob & Associates, 1973.



* AVERAGE OF WATER YEARS 64-65 TO 73-74 MINUS TWO HIGHEST RECORDINGS

FIGURE 15 SALINAS RIVER FLOWS RECORDED AT SPRECKELS GAGING STATION

SOURCES: YODER, TROTTER, ORLOB & ASSOCIATES, 1973; US GEOLOGICAL SURVEY, WATER RESOURCES DATA FOR CALIF., 1966-1975 these uses are frequently not met, especially during low flow periods. Ammonia, total phosphate, and *dissolved oxygen* levels in the lower river often do not meet standards. Electrical conductance and *pH* standards are also exceeded in the Salinas River lagoon at various times of the year.

From the City of Salinas to the ocean, river water quality is influenced by extreme seasonal fluctuations in surface flow, discharge of secondarily treated wastewater from Salinas, and agricultural return flows. From December through March, when 94 percent of the annual runoff occurs, water quality usually meets RWCQB standards for beneficial uses along the entire stretch of the river.

In low flow periods (usually April through November) the river below the Salinas-Alisal treatment plant outfall is mostly secondary treated sewage effluent. Dissolved oxygen levels are low (frequently less than 4 *mg/l*), the river bottom is coated in some locations with sludge, and there is often a strong hydrogen sulfide odor. Total *dissolved solids (TDS)* levels often exceed 900 *ppm* (compared to 225-650 *ppm* in high flows), reflecting the input of treatment plant effluent and agricultural runoff and the low level of dilution from surface flows. Bacterial counts exceed the public health limits for recreational use of the waterway. Table 6 presents quality fluctuations recorded in 1964 and 1965 by the California Department of Water Resources. These data, although slightly dated, give the best available picture of quality fuctuations along the lower river during both low and high flow conditions (more recent, but less complete data are provided in Table E-1).

The California State Bureau of Sanitary Engineers indicated there is a gradual increase in coliform bacteria contamination of the river below Salinas (California State Department of Public Health, 1971). Coliform counts in excess of 24,000 *MPN/* 100 ml were recorded near Blanco Road during low flow conditions in May 1971, and more recently in October of 1975 (Baldridge, pers. comm.). Similar high coliform counts have been recorded on other stretches of the lower Salinas River.

Mineral levels also gradually increase downstream until Blanco Drain irrigation return water enters the river causing a large jump in TDS and nutrient levels.

Pesticide residues are found in high concentrations throughout the lower Salinas River. Table E-2 presents data collected from several locations along the river in the 1971-1972 water year; all stations recorded pesticide levels in excess of EPA and RWQCB recommended standards for freshwater aquatic use. Dieldrin content exceeded the recommended standards by 10 parts per trillion (*ppt*) during high flows below Blanco Drain and by 1,550 ppt during low flow at the State Highway 1

Table 6

SALINAS RIVER WATER QUALITY, 1964-65

Parameter	Highway 68		One Mile Below Blanco Drain		Highway 1		Lower Lagoon	
	Low Flow[1]	High Flow[2]	Low Flow[1]	High Flow[2]	Low Flow[1]	High Flow[2]	Low Flow[1]	High Flow[2]
Temperature, °F	66–69	50–63	66–69	50–63	66–70	50–63	66–70	50–63
pH	7.3–7.5	--	8.2–9.1	7.5–7.7	9.0–9.6	7.5–8.7	9.0–9.6	7.8–8.7
Dissolved oxygen, ppm	<4	5.9–9.5	16–23	9–13	9–32	7–28	3–32	8–28
Specific conductance, micromhos/cm^3	1,426	377–1,081	2,059	377–8,500	1,900–>10,000[3]	397–>10,000	—	—
BOD, ppm	2.8	3.7	14	4.7	24	—	16	—
DDT, ppt	--	—	60	10	—	—	40	—

---

[1] Measurements made during August, September and October of 1964; flows measured at Highway 68 bridge ranged from 0.7–4.0 cfs.

[2] Measurements made during January, February and March of 1965; flows measured at Highway 68 bridge ranged from 8–1,490 cfs.

[3] Measurement period from September to December, 1964.

Source: California Department of Water Resources, 1965; sampling locations are shown on Figure 12.

bridge. A similar pattern of high levels was recorded for parathion. Concentrations of pesticides are highest during the summer when agricultural return flows are at a peak and normal stream runoff is low. It appears that recommended levels are exceeded for some compounds on a year-round basis, however. Only a few of the compounds identified in the sampling are presented in the table, but they reflect the high concentrations and the seasonal fluctuations in pesticides.

Approximately 1.5 miles before entering the bay the Salinas becomes a tidal lagoon (Figure 16), the flow traveling directly west through lagoon and sand dunes to the ocean. A sandbar builds up across the mouth of the lagoon in June or July and usually remains throughout the summer, reducing tidal influence and lowering water quality by retaining upstream wastewater discharges and agricultural runoff. There are nearly constant algal blooms, and large *diurnal* fluctuations in dissolved oxygen. During low flows, the bacterial contamination is also high. Samples collected in May 1971 at the Highway 1 bridge contained 1,950 MPN/100 ml median total coliform and 230 MPN/100 ml median fecal coliform. Flows during this sampling period were estimated to be 7.3 cfs (4.7 mgd) at the Spreckels gauging station (California Department of Public Health, 1971). In the fall, the Monterey County Flood Control and Water Conservation District (MCFCWD) often bulldozes the river mouth open, to minimize flooding and improve local drainage along the lagoon.

Tidal influxes through the Salinas River lagoon occasionally reach more than one mile upstream, significantly raising the river TDS level. The 1964-65 Department of Water Resources study of the lower river recorded a specific conductance of 8,500 *micromhos* (roughly 5,950 TDS) nearly two miles upstream from the Highway 1 bridge.

Salinas River Tributaries. The main study area streams tributary to the Salinas River are Gabilan, Alisal, Quail, and El Toro Creeks. Gabilan and Alisal actually empty into the Main Reclamation Ditch near Salinas. These streams carry small flows in the wet months, January to April or May. El Toro Creek drains the Sierra de Salinas Mountains between Salinas and Monterey on the west side of the valley (Figure 12). Quality data for these streams have not been included, as little is available. Quality data for the Main Reclamation Ditch and the Salinas River reflect the input of these small tributary streams.

Blanco Drain. Blanco Drain carries the irrigation return water of 6,000 agricultural acres southwest of Salinas into the Salinas River 4 miles upstream from the State Highway 1 bridge (and 4-1/2 miles downstream from the main Salinas wastewater treatment plant discharge). Volume of flow is highly seasonal and has not been regularly measured, but the MCFCWD recently

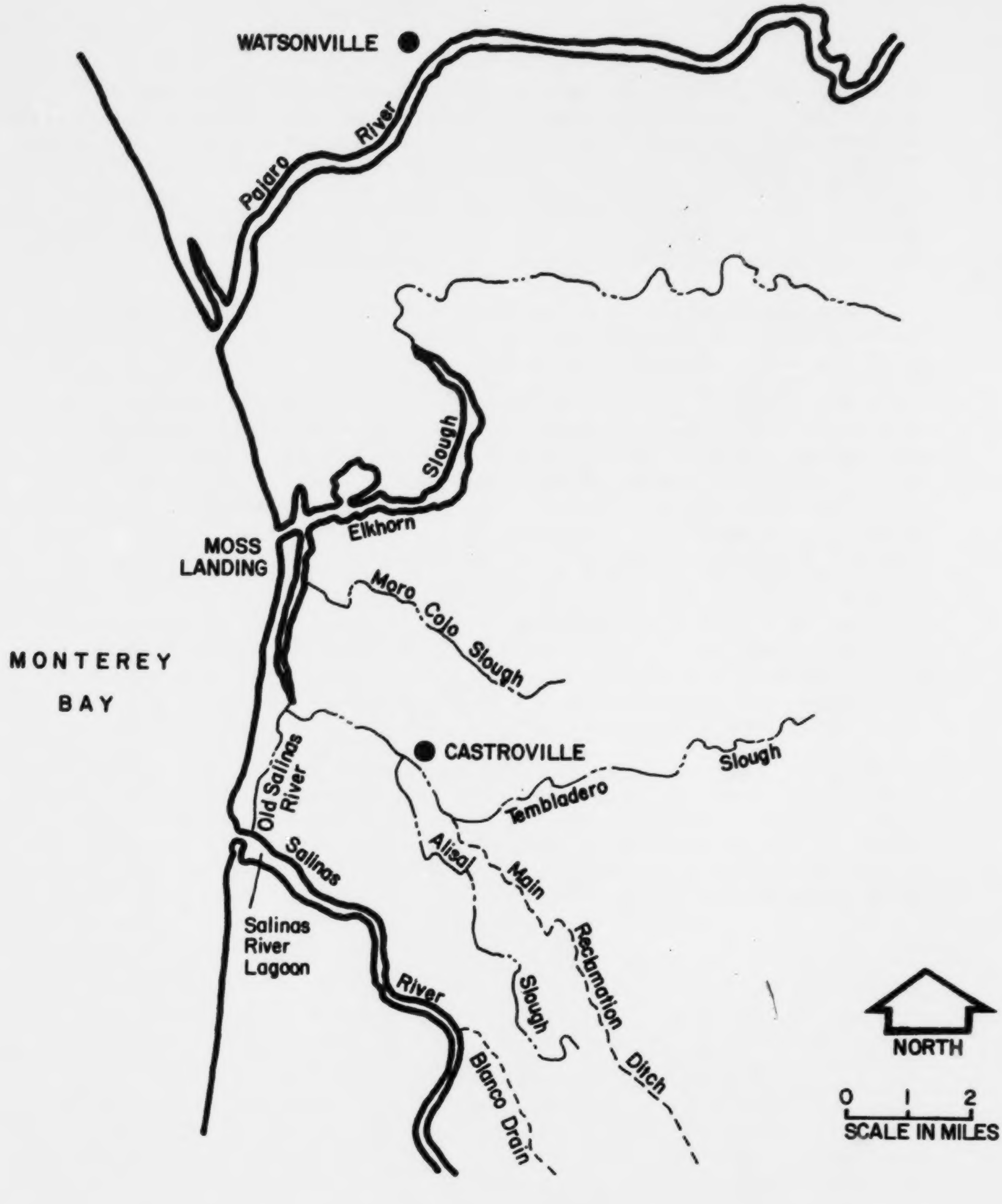

WATSONVILLE
Pajaro River
Elkhorn Slough
MOSS LANDING
Moro Cojo Slough
MONTEREY BAY
CASTROVILLE
Tembladero Slough
Old Salinas River
Salinas River
Salinas River Lagoon
Alisal Slough
Main Reclamation Ditch
Blanco Drain
NORTH
0 1 2
SCALE IN MILES

FIGURE 16 SURFACE WATERS OF THE LOWER SALINAS VALLEY
(MODIFIED FROM: WATER RESOURCES ENGINEERS, INC. 1969)

began a flow monitoring program. There are generally two annual peaks in flow, one during crop irrigation in the summer months and one in the winter from storm runoff. Some estimates of Blanco Drain flows were presented in the Salinas River section above.

Highly mineralized inflow from a perched water table and pesticides and nutrients in irrigation runoff contributed to the poor water quality of the drain. Agricultural runoff may at times improve the mineral quality in the drain by diluting the high TDS groundwater inflows (from the surface aquifer). However, during the rainy season when irrigation return flows are low, groundwater may rise to the point that it surfaces in the drain, creating extremely high TDS conditions.

TDS levels in Blanco Drain near its discharge to the Salinas range from 3,900 to 4,300 mg/l (U. S. Bureau of Reclamation, 1971). This exceeds the RWQCB recommended limit of 1,500 mg/l for freshwater aquatic life and fish migration (designated beneficial uses of the Salinas below the Blanco Drain discharge). Total nitrogen and *phosphorous* frequently exceed standards for maintaining the river's warm water fishery (California Regional Water Quality Control Board, Central Coast Region, 1974a). The recommended standards are 2.0 and 0.2 mg/l respectively for nitrogen and phosphorous. Total nitrogen levels frequently exceed 10 mg/l and total phosphorous has been recorded recently at 1.0 mg/l (Taylor, pers. comm.). This excess of nutrients contributes to large algal blooms and, consequently, low dissolved oxygen levels in the Salinas River during the summer. The Monterey County Flood Control and Water Conservation District is now monitoring the quality of Blanco Drain water on a regular basis as requested by the RWQCB. This is seen as a first step toward solving any water quality problems created by the agricultural return flows.

Though *herbicide* and pesticide analyses in Blanco Drain have been infrequent, in May 1971 the California Department of Public Health (1971) recorded 200 parts per trillion (ppt) parathion in the drain one half mile above its discharge to the Salinas River. The maximum level recommended for streams supporting freshwater aquatic life is 1 ppt.

Main Reclamation Ditch. The Main Reclamation Ditch carries runoff from Gabilan and Alisal Creeks, a large agricultural area between Salinas and the coast, and several industrial discharges. It empties into Tembladero Slough near Castroville. There is water in the ditch year round, with peak flows from December to March (storm runoff) and again during July and August (agricultural return water).

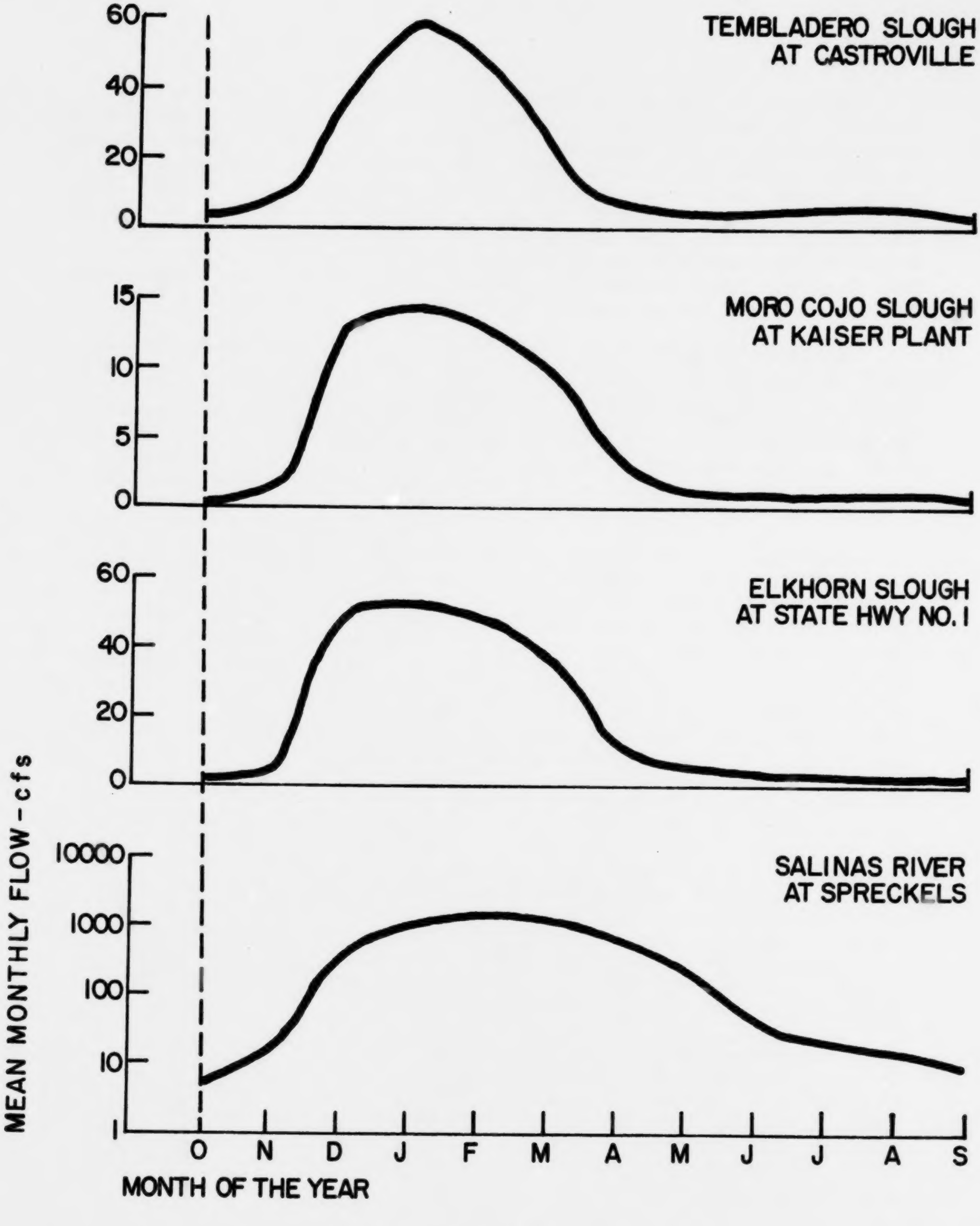
Maximum recorded discharge at San Jon Road (2-1/2 miles west of Salinas) was 401 cfs in February 1973, and the minimum was 0.34 cfs in January 1972 (U.S. Geological Survey, 1973). Mean monthly discharges range from 4-55 cfs at this location (Monterey County Flood Control and Water Conservation District, n.d.). Flows are not recorded at the junction of the Main Reclamation Ditch and Tembladero Slough.

Water quality in the Main Reclamation Ditch is checked regularly at its junction with San Jon Road just west of Salinas (Table E-4). When industrial food processing plants are operating in Salinas, there is a peak in TDS and *chloride* concentration, reduced somewhat downstream by the inflow of agricultural return water. Phosphates and nitrates have been measured in high concentrations. As the table shows, pesticide levels measured in 1971 exceeded EPA and RWQCB standards for freshwater aquatic habitat and the RWQCB's standards for saltwater habitat. Pollutants carried in the Main Reclamation Ditch are discharged to the Old Salinas River via Tembladero Slough. This water eventually flows into Moss Landing Harbor and Elkhorn Slough, which supports an exceptional population of estuarine flora and fauna.

Elkhorn, Tembladero and Moro Cojo Sloughs. Elkhorn, Tembladero and Moro Cojo Sloughs drain agricultural land and rolling hills near Castroville. *Hydrographs* of the average annual flow in these three sloughs were estimated by Water Resources Engineers in 1969 (see Figure 17).

Tembladero Slough receives agricultural water and storm runoff from the Merritt Lake area, the Main Reclamation Ditch, farmlands south of Castroville, and about 0.3 mgd of treated Castroville wastewater (wastewater is not included in the hydrograph). The slough flows into the Old Salinas River channel west of Castroville and upstream from a tide gate which reduces salt water influence in the Old River channel. These waters eventually flow into Moss Landing Harbor and Monterey Bay.

Samples analyzed by the State Department of Water Resources and Department of Public Health over the last 30 years indicate TDS ranges from 680-1,770 ppm at the Highway 1 overcrossing of Tembladero Slough. Chlorides range from 94-354 ppm, nitrates from 20.4-36.2 ppm and total coliforms from 620-2,300 MPN/100 ml (U.S. Bureau of Reclamation, 1974). Downstream below the Castroville treatment plant, TDS and bacteria counts are much higher. The high TDS levels are due in large part to tidal influences through Moss Landing Harbor and Old Salinas River, and are therefore a natural condition that has existed for many years. Installation of the tide gate on the Old River has undoubtedly reduced TDS levels from previous years, however. Total coliform counts as high as 24,000 MPN/100 ml have been recorded at the mouth of Tembladero Slough.



AVERAGE ANNUAL HYDROGRAPHS

FIGURE 17

SOURCE: WATER RESOURCE ENGINEERS, 1969

Moro Cojo Slough is directly connected to Moss Landing Harbor. Historically it was subject to tidal influence; however, construction of a tide gate at the State Highway 1 overcrossing in 1932 turned the slough into a brackish water area with little or no ocean influence (Gordon, 1974). Agricultural runoff and evaporation have acted to maintain extremely high TDS levels in the slough during the summer months. Soil Control Labs of Watsonville recently analyzed the slough's water quality for the Central Coast Regional Coastal Zone Conservation Commission. Their findings are presented in Table 7.

Elkhorn Slough is directly connected to the ocean through Moss Landing Harbor and is therefore under tidal influence. Daily tide cycles and annual changes in freshwater inflow constantly alter salinity. A tide gate at the Elkhorn Road crossing limits the inland influence of the salt water. Runoff from the low rolling hills east and northeast of the slough and scouring by the tides are sufficient to keep the mouth of the slough open to the ocean year-round.

Because of its closeness to commerce and industry, and its value as a wildlife habitat, Elkhorn Slough's water quality is well documented. Bacterial counts in the slough have increased steadily since the late 1950's. The County Health Department measured total coliform levels as high as 24,000 MPN/100 ml in 1970 (Browning, et.al., 1972). Waste discharges from commercial and recreational boats in Moss Landing Harbor, runoff from dairies on the south bank of the slough, and treatment plant effluent carried in from Tembladero Slough and Old Salinas River all contribute to the high counts. A detailed bacterial analysis of the slough conducted by Water Resources Engineers (1969) in 1968 indicated highest fecal coliform counts occur during flood tides when materials are carried up the slough from the harbor. Samples taken from nine stations in the slough from Highway 1 to a point 3-1/2 miles inland contained median fecal coliform counts of approximately 40 to 75 MPN/100 ml and maximum counts of 50 to 2,000 MPN/100 ml (Water Resources Engineers, 1969). The high readings exceed recommended levels for shellfish harvesting (70) and water contact recreation (200), both of which are beneficial uses assigned to Elkhorn Slough by the RWQCB.

Nitrogen and phosphorous measurements made by the Northern Salinas Valley Mosquito Abatement District in the summer of 1975 do not indicate a high nutrient problem in Elkhorn Slough. Other indicators -- dissolved oxygen levels, pH and turbidity -- also do not indicate a serious *algae* problem, even though it might be expected to occur due to the influx of wastewater into the slough (see Table E-3).

Table 7

MORO COJO SLOUGH WATER QUALITY*

	Sample Location**		
Constituent (mg/l)	M1	M2	M3
pH (pH units)	9.36	8.55	8.20
BOD	0	96	18
Dissolved oxygen	9.8	14.7	8.4
Salinity	36,230	45,680	47,180
Pesticides-DDE	<.0001	.0002	.001
Sodium	10,400	12,500	15,000
Chloride	20,600	26,000	26,800
Cadmium	.003	.002	.002
Total chromium	<.005	<.005	<.005
Nitrate-N	<.1	.52	.17
Nitrite-N	<.01	<.01	<.01
Organic nitrogen	3.10	1.20	4.60
Total phosphorus	1.50	6.60	.1
Phosphate-P	1.03	3.20	.06

* Source: Soil Control Labs (pers. comm.)

** Station M1 located immediately south of Kaiser tailings pond; M2 located on western arm of slough approximately 3,000 feet above junction of the two arms; M3 located on eastern arm of slough approximately 4,000 feet above junction of the two arms.

Old Salinas River. Between 1908 and 1910 the Salinas River cut through to the coast at its present location; this left the old main channel, which empties into the ocean north of Moss Landing, as an intermittent arm (Gordon, 1974). Since then, the junction of the old and new channels has been diked and a tide gate installed to reduce flows through the old channel. A culvert at the junction allows a maximum of 100 cfs to enter the old channel from the new when the gates are open. In the summer months the culvert carries an average of 30 cfs (Water Resources Engineers, 1969). In the fall the tide gate is closed, eliminating wet season flow from the new channel into the old. Before entering Moss Landing Harbor, the Old Salinas River receives runoff from Tembladero Slough. The old channel is also blocked by a tide gate at its entrance to Moss Landing Harbor. Surface flows are therefore influenced by an assortment of variables, including flows in the main Salinas River and Tembladero Slough, and the tide gates.

During the summer, irrigation return water is the principle contributor to the Old River's flow and to its contamination, with high TDS levels and an abundance of nutrients. In the wet season, quality improves.

Marine water influxes through Moss Landing Harbor, in conjunction with agricultural return flows, create high salinity in the Old River. TDS levels from 1,400 to 2,400 ppm were recorded above Tembladero Slough in 1972 (California Department of Water Resources, 1974). Bacteriological contaminants are high. In 1967 the California Bureau of Sanitary Engineering measured total coliform bacteria of >24,000 MPN/100 ml. Coliform sources are not all fecal; agricultural drainage also contributes, but the Castroville sewage discharge is thought to be adding significantly to the bacterial count in the Old River and Moss Landing Harbor (Water Resources Engineers, 1969).

The coliform concentration in Old Salinas River also fluctuates with the tide. Water Resources Engineers (1969) measured the highest fecal coliform count during flood tide (approximately 10,000 MPN/100 ml) and the lowest during slack tide (approximately 600 MPN/100 ml). This indicates that some of the bacterial contamination is carried in from Moss Landing Harbor. Additional water quality data for the Old Salinas River are presented in Table E-5.

Groundwater Quantity and Quality. There are several distinct aquifers within the study area; the major ones are associated with the Salinas River groundwater basin. The three most prominent are the 180-foot and 400-foot pressure aquifers and the East Side aquifer (see Figure 18). The 180-foot and 400-foot are called pressure aquifers because they are overlain by impermeable material, restricting exchange of water between aquifers. The East Side aquifer is an unconfined aquifer; that is, if enough groundwater were present it could rise to ground surface. There is a fourth less extensive aquifer that exists in the lower Salinas Valley above the 180- and 400-foot aquifers. It is *perched* above these deeper aquifers by an impermeable clay layer and is subject to extreme depth and quality fluctuations.

Two aquifers supplied by precipitation on the sand dune terrain of Ft. Ord and vicinity exist along the coast from Marina to Seaside. The minor surface aquifer is little used and is subject to occasional seawater intrusion if pumped heavily. The main aquifer supplies a major portion of domestic water for Seaside, Ft. Ord and Marina.

The 180-foot, 400-foot and East Side aquifers are the principal sources of water in the lower Salinas Valley. They are recharged by natural rainfall and overland flow and manipulated releases from Nacimiento and San Antonio Dams on the upper Salinas River watershed. The estimated annual safe yield of the combined 180- and 400-foot aquifers is 78,000 acre-feet and for the East Side aquifer it is 19,000 acre-feet (Yoder-Trotter-Orlob & Associates, 1973). The surface aquifer is seldom used as a source of water due to its poor quality.

In all three aquifers, there are zones that have much higher TDS concentrations than other parts of the basin. These are mapped in Figure 18. The zone in the 180-foot and East Side aquifers near Salinas is generally believed to be caused by the percolation of agricultural return water through discontinuities in the impermeable layer that overlies the 180-foot aquifer (California Department of Water Resources, 1973a). While the area of the high TDS problem is increasing, the concentration of salt is not. TDS levels in excess of 1,500 mg/l are common in this area. The high salt content is making the groundwater unfit for domestic and agricultural use.

Since 1940 there has been noticeable seawater intrusion into the 180-foot aquifer near the coast. Similar intrusion has occurred in the 400-foot aquifer since 1959. This indicates that there is a serious overdrafting situation in the lower Salinas Valley. A 1955 Department of Water Resources report estimated a 20,000 acre-foot overdraft of the pressure area in that year with an estimated total withdrawal of 98,400 acre-feet (California Department of Water Resources, 1973a). Total withdrawals have increased significantly since that time, as is indicated by the gradual increase in the size of the intruded area (see Table 8). Agricultural and domestic pumping make up the majority of the withdrawals.

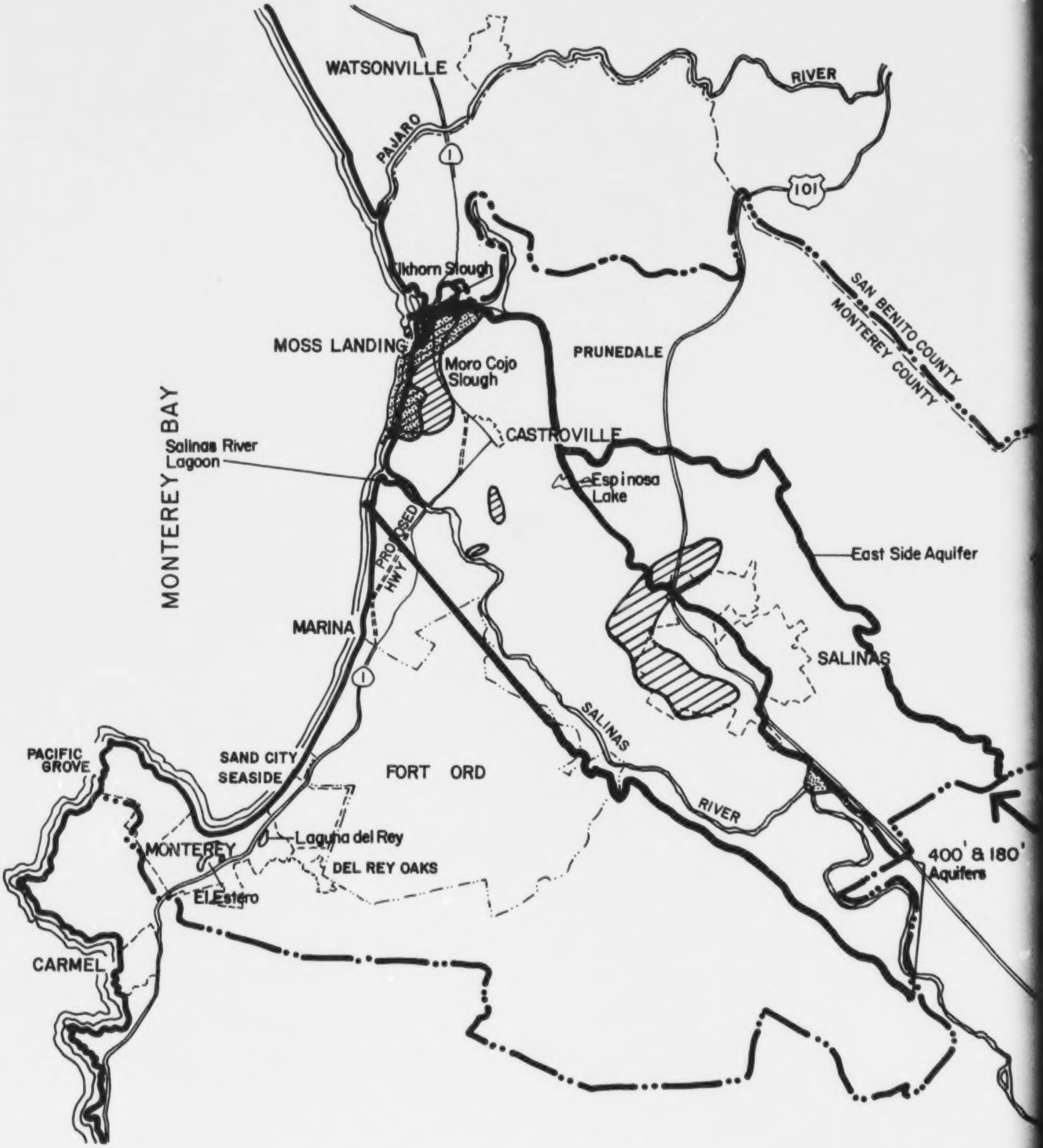
Table 8

AREA OF EFFECTIVE SEAWATER INTRUSION -- ACRES

Groundwater Aquifer	Recorded						Projected	
	1944	1953	1960	1965	1970	1973	1980	1990
180 foot	1,800	5,200	6,700	7,600	8,100	9,700	[10,700]	[12,800]
400 foot	—	—	0	200	1,200	1,900	[3,400]	[5,500]

Source: U. S. Bureau of Reclamation, 1974.

Many wells drawing from the 400-foot aquifer as much as a mile inland between Moss Landing and the Salinas River have been abandoned as TDS concentrations have exceeded 1,500 mg/l. Similar high levels in the 180-foot aquifer extend inland beyond Castroville (Monterey County Flood Control and Water Conservation District, 1976). This increasing problem has forced agriculturalists to make adjustments in their water sources. Some have drilled their wells deeper to find better quality water; others have piped in better quality water from adjacent wells and blended water to reduce the salt problem. In many cases additional water must be added beyond the needs of *evapotranspiration* to leach the excess salts from the soil column. To date there has been no radical change in crop type or actual land abandonment caused by the intrusion, as the farmers have managed to locate water of sufficient quality to irrigate their crops. If intrusion continues to advance at its present rate, however, the remaining good quality groundwater will also become unfit for use. This possibility has prompted planning for the Castroville Irrigation Project, a scheme to pipe Salinas River surface flows from near Salinas to the Castroville area.


WATSONVILLE
PAJARO
RIVER
1
101
Elkhorn Slough
MOSS LANDING
Moro Cojo Slough
PRUNEDALE
SAN BENITO COUNTY
MONTEREY COUNTY
MONTEREY BAY
Salinas River Lagoon
CASTROVILLE
Espinosa Lake
PROPOSED HWY
East Side Aquifer
MARINA
1
SALINAS
SALINAS
RIVER
PACIFIC GROVE
SAND CITY
SEASIDE
FORT ORD
Laguna del Rey
MONTEREY
DEL REY OAKS
El Estero
400' & 180' Aquifers
CARMEL

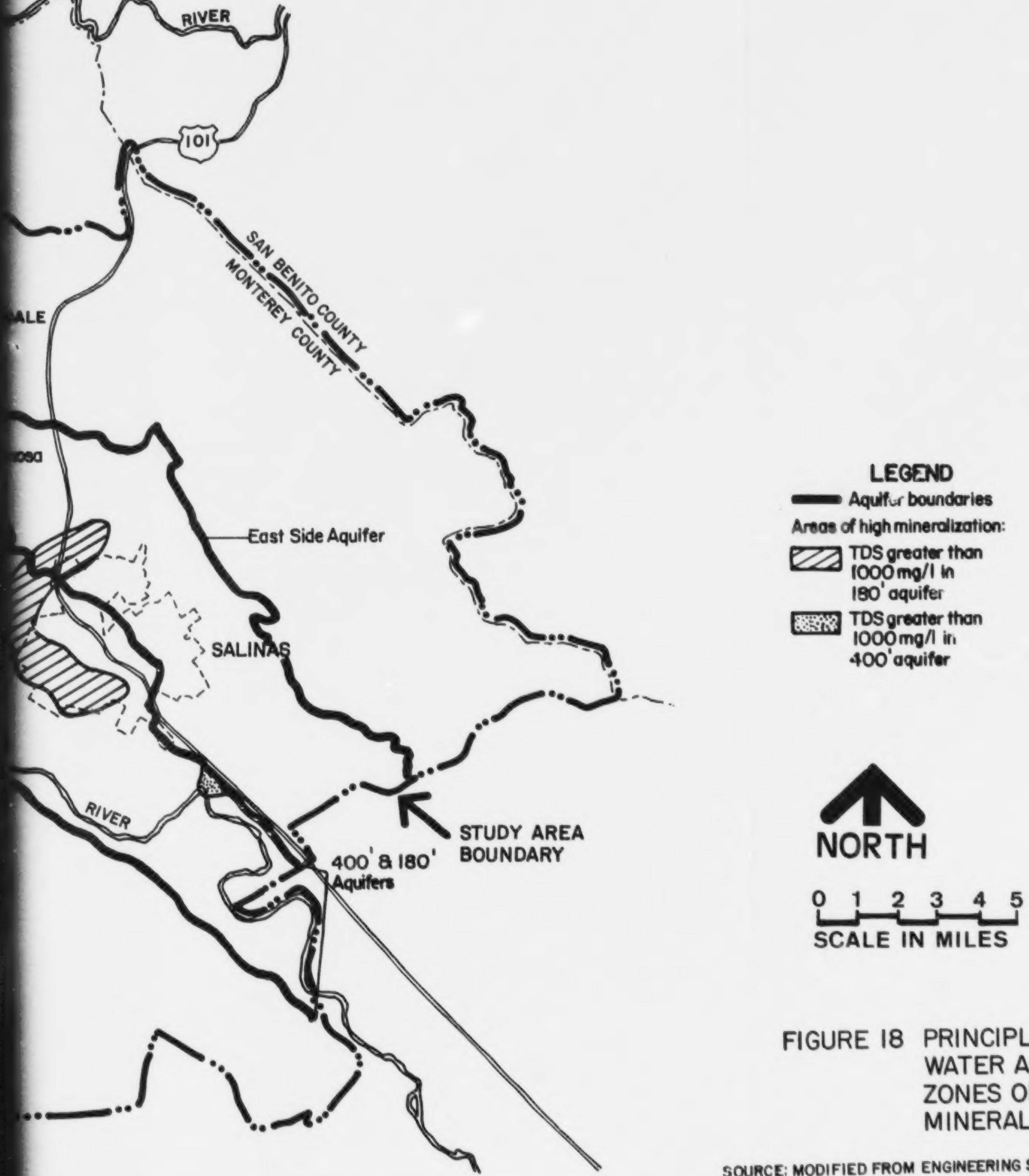

RIVER
101
SAN BENITO COUNTY
MONTEREY COUNTY
ALE
osa
East Side Aquifer
SALINAS
RIVER
STUDY AREA BOUNDARY
400' & 180' Aquifers
LEGEND
Aquifer boundaries
Areas of high mineralization:
TDS greater than 1000 mg/l in 180' aquifer
TDS greater than 1000 mg/l in 400' aquifer
NORTH
0 1 2 3 4 5
SCALE IN MILES

FIGURE 18 PRINCIPLE GROUND WATER AQUIFERS AND ZONES OF HIGH MINERALIZATION

SOURCE: MODIFIED FROM ENGINEERING SCIENCE INC, 1975

The inland progression of intrusion is illustrated in Figure 19. If this trend of intrusion is not halted or an alternative supply of higher quality water is not found, hundreds of acres of the best agricultural land in the state could eventually be subject to undesirable changes in agricultural use and value.

The unconfined East Side aquifer has some hydraulic continuity to the 180- and 400-foot pressure aquifers. As the East Side aquifer is pumped during the irrigation season, the water level drops rapidly, often to 50 feet below mean sea level. This lowering creates a descending hydraulic gradient between the pressure aquifers (180 and 400 foot) and the East Side aquifer, and groundwater moves from the two pressure aquifers to the East Side aquifer. This intensifies the influx of sea water into the 180- and 400-foot aquifers.

The general water quality of the 180-foot, 400-foot and East Side aquifers is extremely variable. For this reason, Table 9 below lists ranges in quality for these aquifers rather than specific estimates.

Table 9

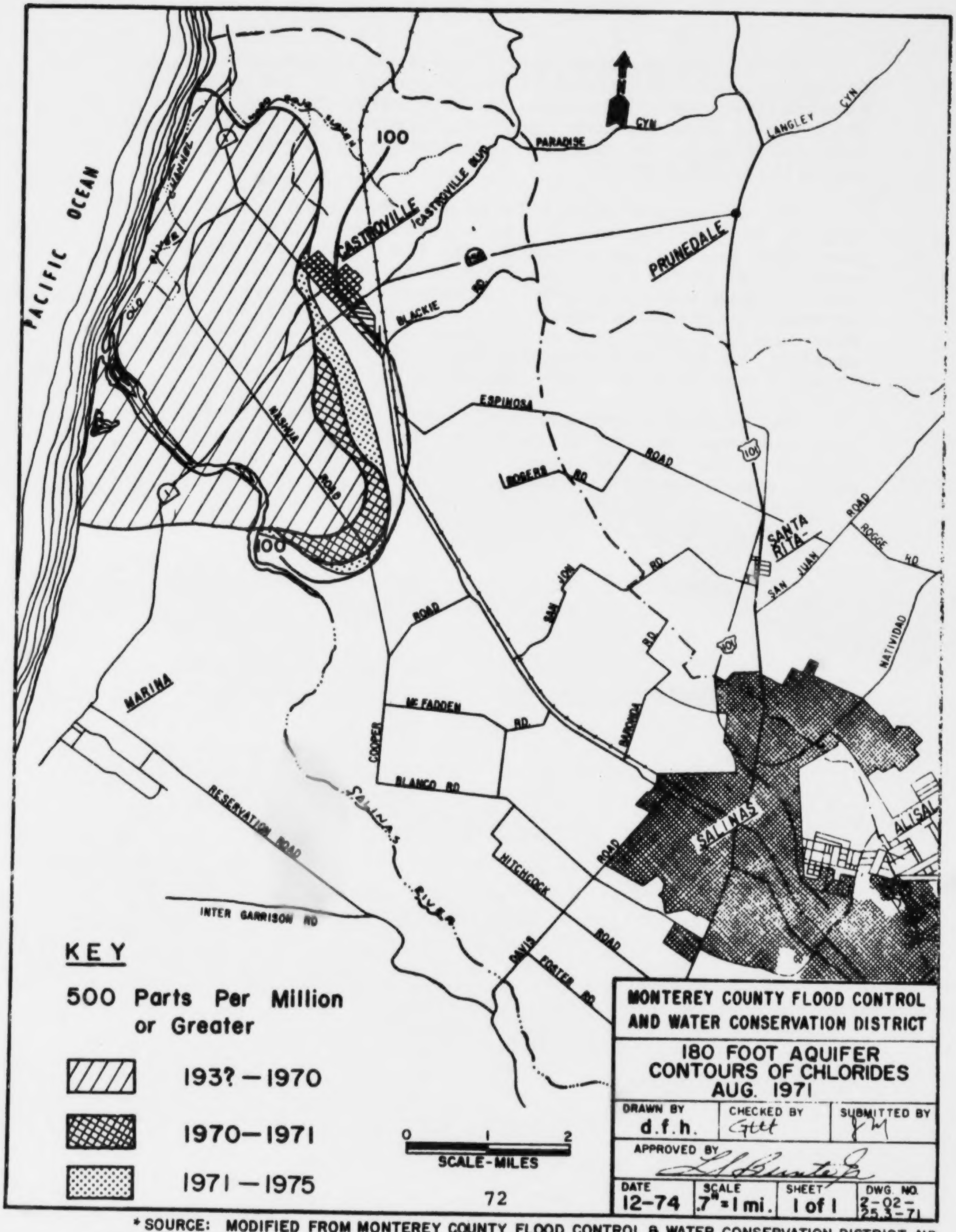
GENERALIZED GROUNDWATER QUALITY IN THE SALINAS RIVER BASIN (mg/l)

Characteristic	180-Foot Aquifer	400-Foot Aquifer	East Side Aquifer
TDS[1]	293-2,751	276-2,541	295-1,582
Boron[2]	.00-.70	.00-.10	.00-.10
Sodium[2]	27-252	24-315	54-93
Chloride[1]	22-1,200	22-1,100	37-460
Nitrate[2]	.0-88.0	.0-21.0	4.2-36.0
Sulfate[2]	5.8-432	12-72	---

[1] Source: California Department of Water Resources, 1973a.

[2] Source: California Department of Water Resources, 1973, 1974.

FIGURE 19 PROGRESSION OF SEA WATER INTRUSION IN THE 180' AQUIFER*


PACIFIC OCEAN
100
CASTROVILLE
CASTROVILLE BLVD
PARADISE
CYN
LANGLEY CYN
PRUNEDALE
BLACKIE RD
OLD SALINAS RIVER CHANNEL
NASHUA ROAD
ESPINOSA
ROAD
ROGERS RD
101
SANTA RITA
ROAD
ROGGE RD
SAN JUAN
NATIVIDAD
SAN JON
RD
ROAD
MARINA
Mc FADDEN
RD.
COOPER
BLANCO RD
BARONDA
SALINAS
ALISAL
RESERVATION ROAD
SALINAS RIVER
HITCHCOCK
ROAD
INTER GARRISON RD
DAVIS
FOSTER RD
KEY
500 Parts Per Million or Greater
1937 – 1970
1970–1971
1971 – 1975
0 1 2
SCALE-MILES
MONTEREY COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
180 FOOT AQUIFER CONTOURS OF CHLORIDES AUG. 1971
DRAWN BY d.f.h.
CHECKED BY
SUBMITTED BY
APPROVED BY
DATE 12-74
SCALE .7" = 1 mi.
SHEET 1 of 1
DWG. NO. 2-02-25.3-71

* SOURCE: MODIFIED FROM MONTEREY COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT, ND.

Monterey Bay Environment.

Morphology and Hydrography. Between the headland of Pt. Pinos at Monterey (ca. 36° 38' 30"N) and Soquel Point to the east of Santa Cruz (36° 57' 15"N) the coast of California bends eastward to form an elliptical indentation, or bight, along a low-lying sandy shore and at the head of a deep submarine canyon (Figure 20). The long axis of this ellipse, which lies just inshore of the two headlands, is about 25 statute miles or 41 kilometers, and trends slightly to the west of True North (about 8°W or 352°). The short axis of this ellipse projected westward into the ocean would be about 15 statute miles. The mid distance of the bay is at the head of the Monterey Submarine canyon at Moss Landing, which is also the site of Elkhorn Slough, a former mouth of the Salinas River. There is no natural boundary between Monterey Bay and the sea, and it is significant that no attempt to estimate the area of the bay has been made by those who have studied it. Monterey Bay is actually a remarkably symmetrical bight. With its symmetrical shoreline and gently sloping bottom (except for the central gouge of the submarine canyon), it resembles a broad-rimmed bowl with most of one side broken off.

Although broadly open to the sea, the shore of Monterey Bay is not a completely exposed coastline because of the wave refraction around the headlands. The bottom of the bay slopes gently toward the rim of the submarine canyon. The 60-foot contour lies 2,000 feet offshore in the southern part of the bay and 12,000 feet offshore in the northern part. South of the canyon the bottom slopes more steeply than it does to the north, but not markedly so; the main difference is that in the northern third of the bay, the 20-fathom (about 120 feet) and 10-fathom (about 60 feet) contours are much farther apart than in the southern section; there is a greater area of shallow, gradually sloping bottom north of the submarine canyon. At the head of the canyon near Moss Landing, there is a steeper slope at the 100-fathom (600 foot depth) line than farther out in the bay. (On the relief model of Monterey Bay, made some years ago by Harold Heath and now hanging in the hall of the Loeb Building at Hopkins Marine Station, the slope of the bottom from shore toward the rim of the canyon is almost imperceptible because no vertical exaggeration of scale was attempted.)

As might be expected from this circumstance, the bottom sediments are more or less evenly graded according to the bottom contours (Figure 21), from "very fine sand" at about the 20 fathom line to inland of the 10 fathom line where the bottom is "fine sand" to the nearshore bottom and beach of "coarse and medium sand". The slope and bottom of the submarine canyon nearshore are characterized by silt and clay,

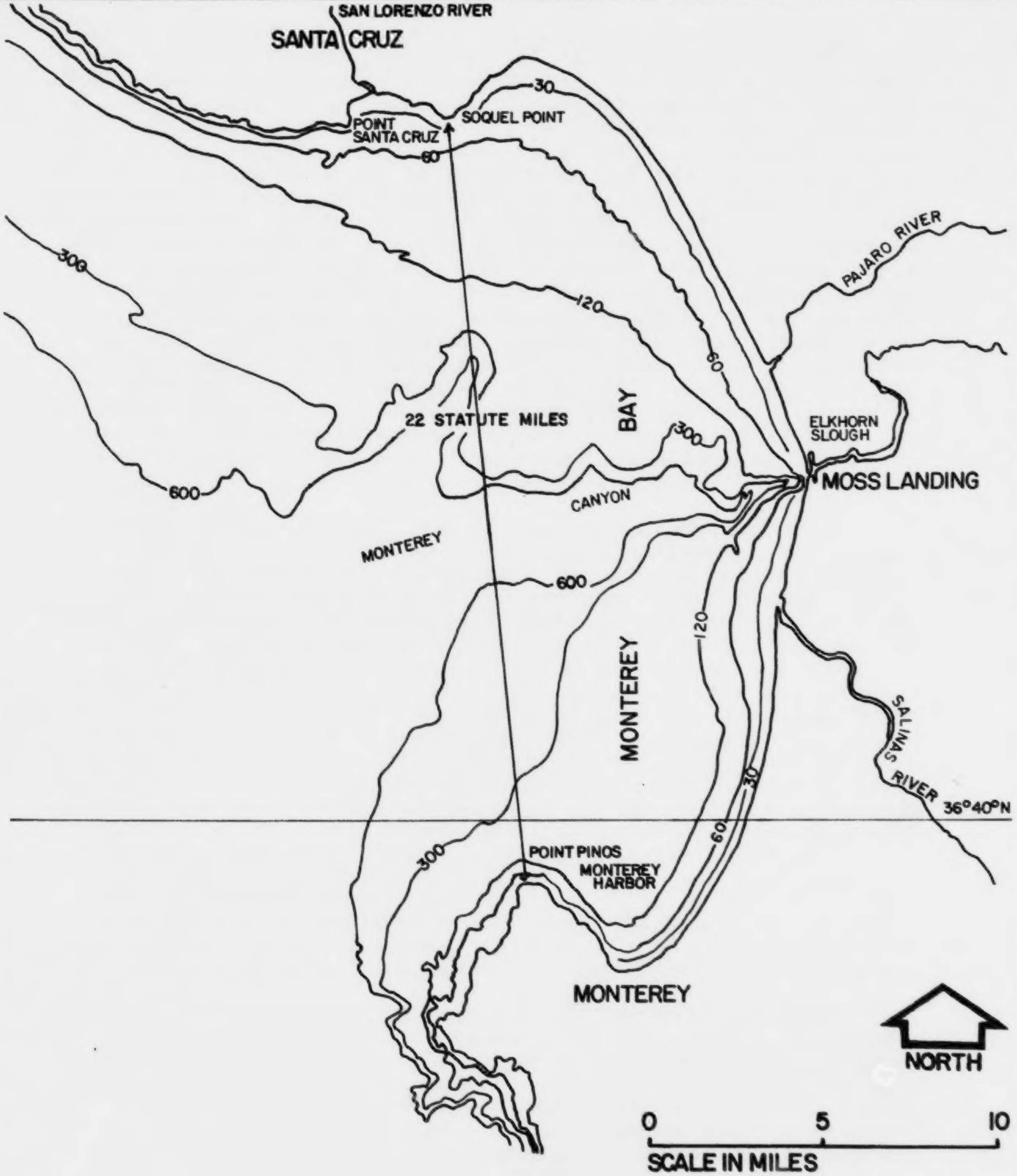
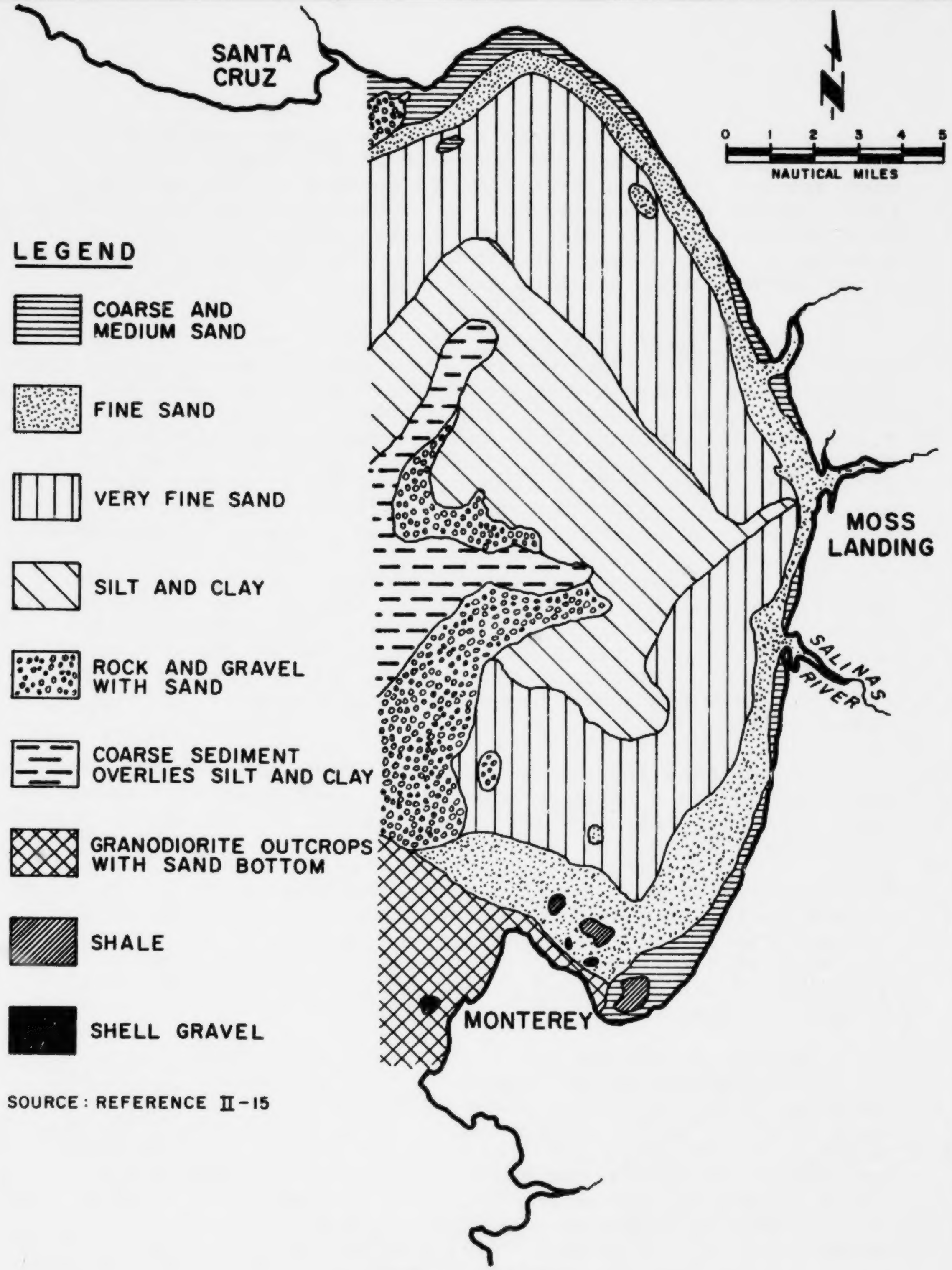

37°00'N
SAN LORENZO RIVER
SANTA CRUZ
30
SOQUEL POINT
POINT SANTA CRUZ
60
300
PAJARO RIVER
120
60
22 STATUTE MILES
BAY
300
ELKHORN SLOUGH
MOSS LANDING
600
CANYON
MONTEREY
600
120
MONTEREY
SALINAS RIVER
30
36°40'N
60
300
POINT PINOS
MONTEREY HARBOR
MONTEREY
NORTH
0
5
10
SCALE IN MILES

FIGURE 20 MONTEREY BAY


SANTA CRUZ
MOSS LANDING
SALINAS RIVER
MONTEREY
N
0 1 2 3 4 5
NAUTICAL MILES
LEGEND
COARSE AND MEDIUM SAND
FINE SAND
VERY FINE SAND
SILT AND CLAY
ROCK AND GRAVEL WITH SAND
COARSE SEDIMENT OVERLIES SILT AND CLAY
GRANODIORITE OUTCROPS WITH SAND BOTTOM
SHALE
SHELL GRAVEL

SOURCE: REFERENCE II-15

FIGURE 21
DISTRIBUTION OF
SEDIMENT TYPES IN MONTEREY BAY

grading to gravel and coarse sediments in the deeper part between the headlands. As a result of topography and wave action, there is a pronounced sorting of the sand so that "coarse and medium sand" is concentrated in the southern part of Monterey Bay below the Salinas River, with an associated buildup of dunes behind the shore. Some of this sand has been mined commercially for many years.

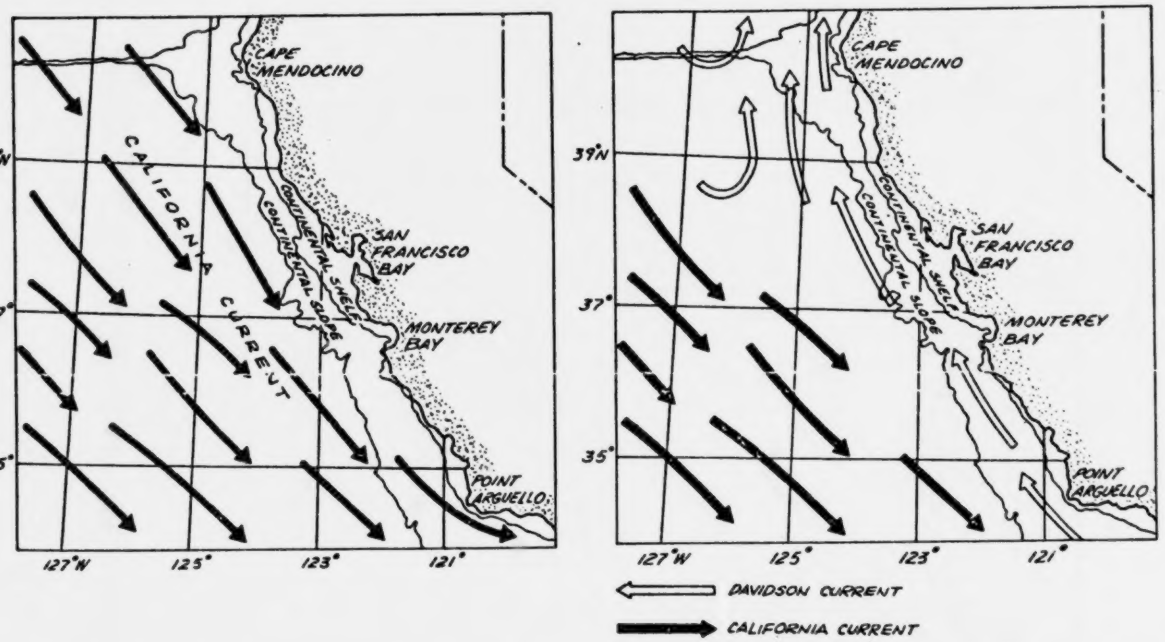
Currents in Monterey Bay. In a 1936 report, Tage Skogsberg remarked that "a study of the *hydrography* of Monterey Bay therefore becomes rather a study of a section of the open sea than a study of a region in which hydrographic peculiarities may be traced to local topographic and meteorological conditions". While there have been some modifications of this view, it is still substantially true that this region is more a part of the ocean in its hydrographic conditions than a bay; certainly its temperature and salinity conditions are oceanic in character.

The major current of the California coast is the southward moving California current lying usually some miles offshore. Near shore there is a counter current at about 200 meters depth moving northward. During the autumn and winter months (about November or December to February), this current reaches the surface and is known as the Davidson current (Figure 22).

In general, the coastal currents move shoreward into Monterey Bay as a broad, slow-moving, open eddy at a speed of less than half a knot. When the movement is northerly, a small clockwise eddy is built up in the southern part of the bay behind Pt. Pinos (Figure 23); southerly movement past Santa Cruz tends to form a small counter clockwise eddy in the north. On the whole, however, the current movement in Monterey Bay follows the isobaths (lines of equal depth) in and out of the bay with little tendency toward vertical mixing even in the vicinity of the submarine canyon. Tidal influences are also slight, because of the open nature of the bay.

During the spring and summer, when the winds are strong out of the north and northwest, the surface water is pushed offshore from the coast, and subsurface water from depths of less than 200 meters moves toward shore and surfaces at the coast. This upwelling of cold nutrient-rich water is especially pronounced to the lee of headlands, but it occurs as far as 50 km offshore. Questions have been raised as to whether wind is the driving force of upwelling in Monterey Bay, but this appears to be the cause. Upwelling contributes some nutrient water to the bay, but vertical movement is so slight compared to horizontal surface movement in Monterey Bay that it has no significant effect on mixing.

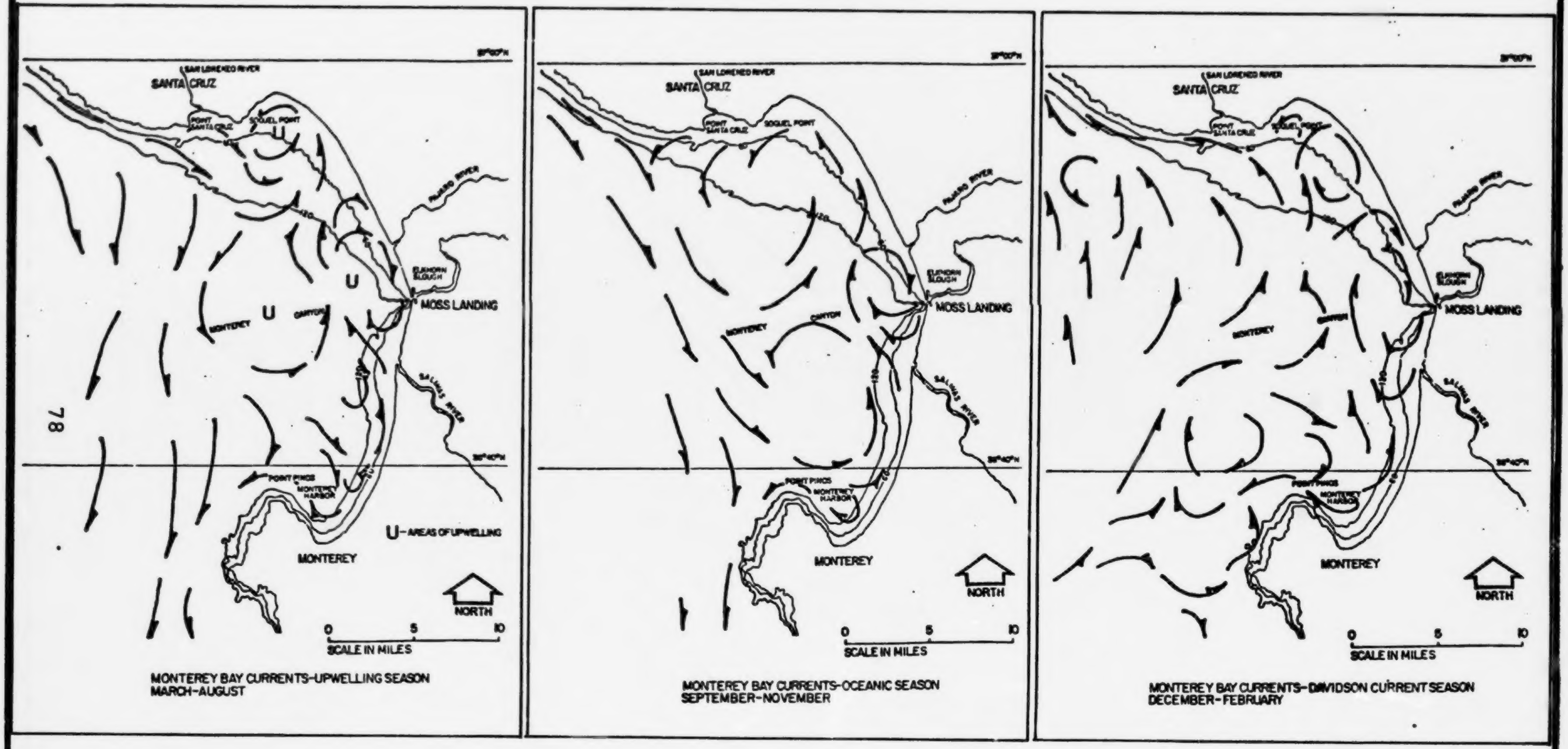
FIGURE 22 MAJOR CALIFORNIA COASTAL CURRENTS


CAPE MENDOCINO
39°N
CALIFORNIA CURRENT
CONTINENTAL SHELF
CONTINENTAL SLOPE
SAN FRANCISCO BAY
37°
MONTEREY BAY
35°
POINT ARGUELLO
127°W
125°
123°
121°
DAVIDSON CURRENT
CALIFORNIA CURRENT

PREVAILING SUMMER CURRENTS OFF THE CENTRAL CALIFORNIA COAST

PREVAILING WINTER CURRENTS OFF THE CENTRAL CALIFORNIA COAST

SOURCE: BROWN & CALDWELL CONSULTING ENGINEERS, 1971


SAN LORENZO RIVER
SANTA CRUZ
POINT SANTA CRUZ
SOQUEL POINT
PAJARO RIVER
ELKHORN SLOUGH
MOSS LANDING
MONTEREY
CANYON
SALINAS RIVER
POINT PINOS
MONTEREY HARBOR
MONTEREY
U
U-AREAS OF UPWELLING
NORTH
0
5
10
SCALE IN MILES

MONTEREY BAY CURRENTS-UPWELLING SEASON
MARCH-AUGUST

MONTEREY BAY CURRENTS-OCEANIC SEASON
SEPTEMBER-NOVEMBER

MONTEREY BAY CURRENTS-DAVIDSON CURRENT SEASON
DECEMBER-FEBRUARY

FIGURE 23 MONTEREY BAY SEASONAL SURFACE CURRENT PATTERNS

SOURCE: PIRIE & MURPHY, 1975

Though arbitrary, it is convenient to divide the year into three "oceanographic seasons" when describing surface currents: the upwelling period from March to August, the oceanic period from September to November, and the Davidson current period from December to February.

During the upwelling and oceanic periods, collectively referred to as the California current season, the general surface current pattern is from north to south, driven by the California current and prevailing winds (Pirie and Murphy, 1975) (see Figure 23). Counterclockwise eddies or gyres form in the northern and southern ends of the bay. Relatively weak currents in the oceanic period result in poor circulation of surface waters and possibly contribute to red tide conditions frequently observed in these months. Gyre velocities are greater (0.1-0.5 knots) during the upwelling period. A third but smaller clockwise eddy often forms offshore from Moss Landing during these two periods.

During the Davidson current season, Monterey Bay surface flows move generally from south to north, driven by the northward flowing coastal current which protrudes into the bay. Three clockwise gyres form at the surface (Figure 23). The orientation of the Monterey Submarine Canyon tends to funnel a high volume of water into the bay during this period (Pirie and Murphy, 1975).

Temperature. Water temperatures are generally lowest during the upwelling period (10-11°C or 50-52°C). In the northern and southern parts of the bay, temperatures may be higher by 3°C (5°F) or more during this period. As the upwelling dies off and the oceanic period sets in, temperatures are warmer and reach their annual maxima of 13 to 16°C (55-61°F). During these oceanic and upwelling periods, a *thermocline* (a layer in a thermally stratified water body that separates a warmer, lighter zone of water from a colder, denser zone) of 3°C (5°F) or more is developed in the upper 50 meters, influenced by upwelling. During the Davidson current period, surface temperatures vary less than 1°C (1.8°F) over the bay and there is a gradient of less than 1°C in the upper 50 meters of water. This temperature progression may vary from month to month during the year, but is in general fairly consistent (Figure I-4).

Salinity. The surface salinity of Monterey Bay is seldom below 33 parts per thousand or above 34 parts per thousand; the highest salinities occur during the end of the upwelling period and the lowest during the rainfall and runoff periods. Most of the area draining into Monterey Bay receives 16-20 inches of precipitation annually. Much of the annual flow of water has been appropriated for agriculture and domestic supply, and therefore does not reach the ocean to affect salinity.

Water Quality. The quality of Monterey Bay waters is influenced by the natural oceanographic conditions described above and man's activity on the land, including disposal of wastes. There are currently 8 domestic wastewater and 2 industrial discharges directly to the bay (Figure 24); in addition, several streams and sloughs carry agricultural, industrial and domestic wastes and sediments into the bay. The growing influence of man's activity on bay water quality has prompted numerous studies of local water management and waste disposal systems, including preparation of the North Monterey County Facilities Plan.

The bacterial contamination of the bay has been of concern to local and state health departments for several years. A 1970 study (Monterey County Health Department et al, 1970) determined that there were unacceptably high coliform counts in near shore waters in the vicinity of most of the domestic wastewater ocean discharges. This contamination is a health hazard to both water contact sports and shellfish harvesting. Table E-6 presents some of the study's findings. Many of the coliform counts exceed the SWRCB near shore ocean waters standard of 1000 MPN/100 ml (California State Water Resources Control Board, 1972) and the RWQCB shellfish area standard of 70 MPN/100 ml (California Regional Water Quality Control Board, Central Coastal Region, 1974). Recreational use of the beaches, including clamming, swimming and fishing, have in the past been a major drawing point for both tourists and residents and is therefore an important aspect of the local economy. The shallow depths and short lengths of existing outfalls allow contaminated wastewater to be transported inshore toward recreation areas by tidal currents without receiving significant dilution. Many of the bacteria and viruses present in domestic wastewater are pathogenic and are therefore a hazard if ingested.

The AMBAG Water Quality Management Plan (Yoder-Trotter-Orlob & Associates, 1973) further identified water quality problems developing in Monterey Bay. An analysis of the bay's circulation pattern identified pockets and sluggish circulation areas in both the north and south ends of the bay. The wastewater outfalls in these pockets (see Figure 24) are suspected of contributing to nutrient build-ups, occasional algae blooms, and coliform concentrations. There are little data on heavy metals concentrations. Nutrient build-ups also occur near the entrance to Moss Landing Harbor, but this is related to periodic upwelling of deeper water, not waste discharges. The problems related to poor circulation have prompted the RWQCB to establish a wastewater discharge prohibition area inside a line drawn from Pt. Pinos to the mouth of the Salinas River (Figure 24). The Pacific Grove, Monterey, Seaside, Ft. Ord, and Marina ocean outfalls are inside this prohibited zone and must now be relocated or eliminated.

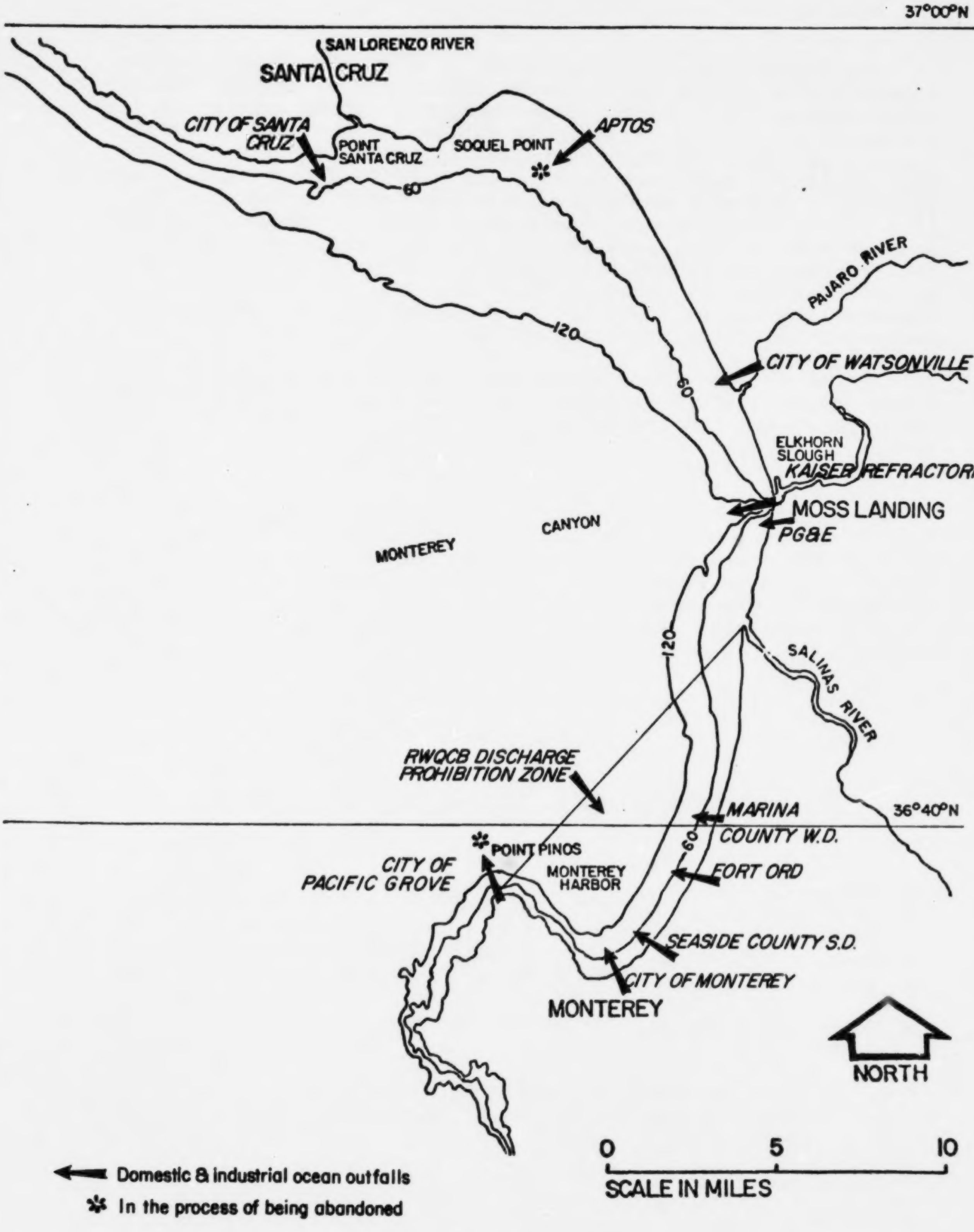

37°00'N
SAN LORENZO RIVER
SANTA CRUZ
CITY OF SANTA CRUZ
POINT SANTA CRUZ
SOQUEL POINT
APTOS
60
PAJARO RIVER
120
60
CITY OF WATSONVILLE
ELKHORN SLOUGH
KAISER REFRACTORIES
MOSS LANDING
PG&E
MONTEREY CANYON
120
SALINAS RIVER
RWQCB DISCHARGE PROHIBITION ZONE
MARINA COUNTY W.D.
36°40'N
POINT PINOS
60
CITY OF PACIFIC GROVE
MONTEREY HARBOR
FORT ORD
SEASIDE COUNTY S.D.
CITY OF MONTEREY
MONTEREY
NORTH
0
5
10
SCALE IN MILES
Domestic & industrial ocean outfalls
✻ In the process of being abandoned

FIGURE 24 EXISTING OCEAN DISCHARGES TO MONTEREY BAY

The AMBAG Plan also identified an area of probable pesticide build-up in the bay between Elkhorn Slough and the Salinas River (Figure 25). Runoff from these two inland waters carries a significant volume of agricultural land runoff and domestic wastewater which contain pesticide loads (see Table E-2). The high pesticide loads are potentially hazardous to marine life inhabiting the area and any animals that come to the area for food. This includes man. Some pesticides are accumulated and concentrated as they pass through the food chain and may eventually reach levels which can impair growth, result in reproductive failure, or cause chronic illness. Reproductive failure in brown pelicans has been attributed to high pesticide concentrations within their food chain.

AMBAG is conducting a non-point source water pollution study which is aimed at identifying and reducing pesticide and other pollutant contamination of the area's surface waters and the bay. No data were found on current pesticide levels in Monterey Bay sediments.

Kaiser Refractories and Pacific Gas and Electric Company have industrial ocean discharges in the Moss Landing area (Figure 24). The PG & E outfall carries only sea water that has been used in cooling electrical power generator turbine condensers. The returned sea water has an average temperature of 75°F. Table 10 summarizes the characteristics of the Kaiser outfall. Both extend approximately 800 feet offshore.

TABLE 10

KAISER INDUSTRIAL DISCHARGE QUALITY
1973 SUMMARY*

Ave. Daily Flow	28.72 mgd
Ave. pH	10.1
Ave. Temp.	19°C (66°F)
Turbidity	51 JTU
Sus. Solids (daily)	22,800 lbs. (primarily magnesium oxide and calcium oxide)**
Settleable Solids (daily)	Trace (<0.1 ml/l)

* Source: Data supplied in personal communication from Regional Water Quality Control Board, Central Coast Region, 1976.

** Source: Roger Briggs, personal communication.

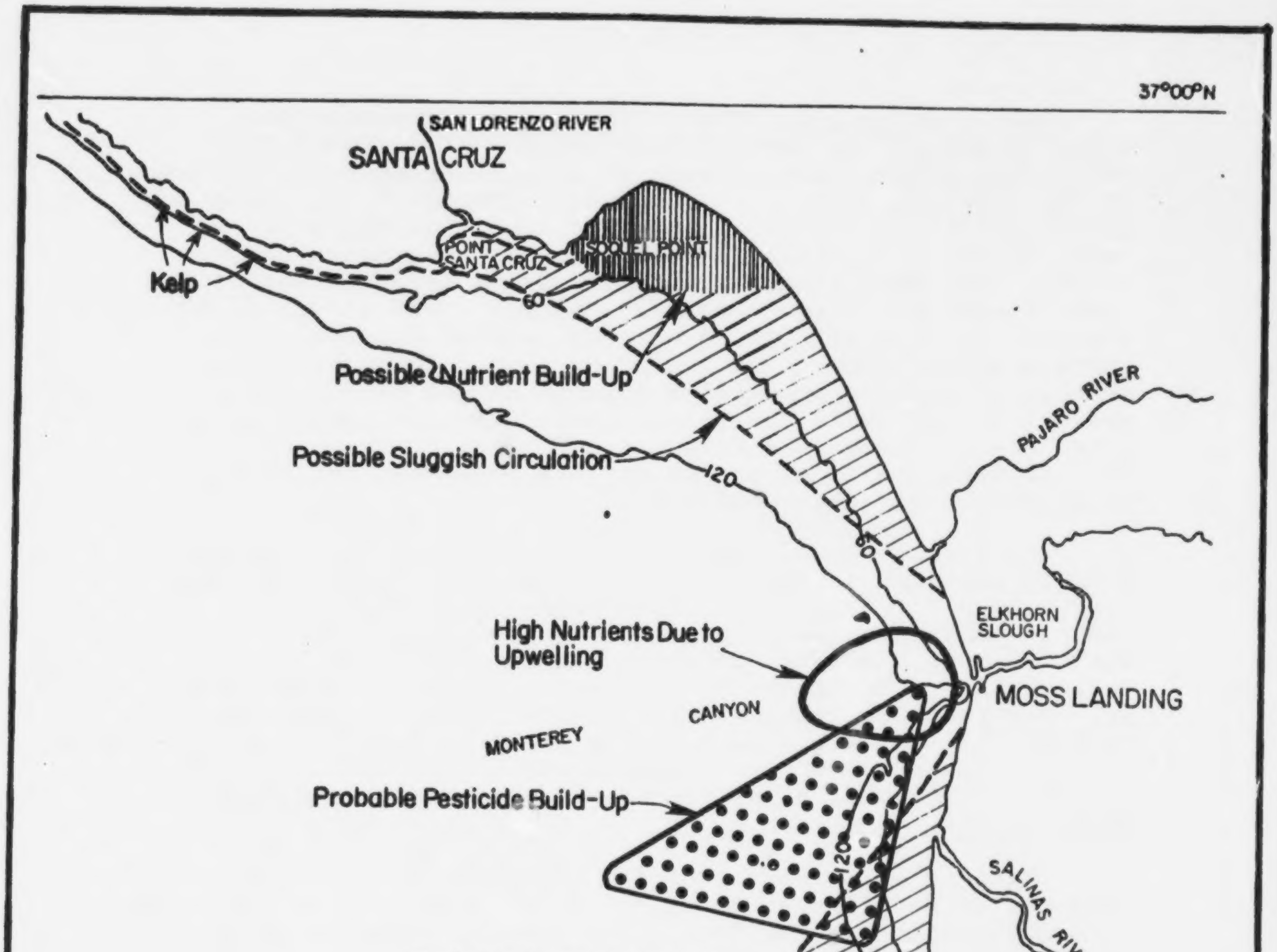

37°00'N
SAN LORENZO RIVER
SANTA CRUZ
POINT SANTA CRUZ
SOQUEL POINT
Kelp
60
Possible Nutrient Build-Up
Possible Sluggish Circulation
120
PAJARO RIVER
60
ELKHORN SLOUGH
High Nutrients Due to Upwelling
MOSS LANDING
CANYON
MONTEREY
Probable Pesticide Build-Up
120
SALINAS RIVER
Probable Sluggish Circulation
36°40'N
POINT PINOS
Possible Nutrient Build-Up
MONTEREY HARBOR
60
Incoming Water
MONTEREY
NORTH
0
5
10
SCALE IN MILES

FIGURE 25 DISTRIBUTION OF FACTORS AFFECTING MONTEREY BAY WATER QUALITY

SOURCE: OCEANOGRAPHIC SERVICES, INC, 1973

Marine Organisms. The nutrient concentrations that build up during the upwelling period fall off toward the end of September; this pattern of annual variation is reflected in the standing crop of *phytoplankton* (Figure I-4). Usually phytoplankton is highest in May and June, but there may be peaks as early as March in some years. The highest *plankton* volumes have been noted during periods of intermittent rather than steady upwelling. Possibly, as Bolin and Abbott (1963) suggest, this is associated with horizontal divergence of surface water rather than low production. In general, the pattern of primary production (the amount of material [or energy] formed by an individual, population or community of green plants during a defined time period) corresponds with that of other parts of the California coast and reflects prevailing oceanographic conditions.

The evenly-graded sand bottom of Monterey Bay does not support the rich assemblage of infaunal species such as deep burrowing bivalves and detritus feeding polychaete worms and the smaller elements associated with Zostera characteristic of more sheltered embayments such as Elkhorn Slough (especially as described by MacGinitie, 1935) in years gone by. Nevertheless, there is a characteristic and rich development of shallow water benthos. In Monterey Bay this conspicuous fauna consists of such crustacea as amphipods and ostracods, a polychaete, several bivalves and the sand dollar (Dendraster excentricus).

There is at times a grouping referred to as an amphipod-ostracod-sand dollar association (a group of species that tend to occur together), but data from repeated sampling at several localities show considerable variation in the comparative composition of the samples (Figure I-1). Most notable is the absence of sand dollars from several stations until the last set of samples. This suggests either the sample location was changed, or more likely, because of the fairly uniform appearance of the sand dollars at all the stations, that they tend to move about and this set of samples may therefore indicate a shift at a bottom assemblage associated with the movement of sand dollars. It is this tendency of animals on sandy bottoms to move about that makes it difficult to characterize the benthic life of Monterey Bay. The two most characteristic organisms of the *intertidal* and *subtidal* region of Monterey Bay are the egg-shaped sand crab (Emerita) and the pismo clam, now greatly depleted both by clam diggers and by sea otters. The sporadic occurrence of these and other animals occurring in intertidal sandy beaches is well known. Good and bad years may be associated with the fate of swarms of larvae, in turn related to variations in nearshore currents.

Monterey Bay has been one of the most significant fisheries regions of the California coast. In times past, it was briefly the major fishing port of the country during the great sardine years. Now sardines are not even seen in the Monterey area. Many of the fishes now caught commercially in Monterey Bay are bottom feeders, and the location of the principal fishing grounds is an indication of a productive benthic invertebrate fauna that sustains them (Figures I-2 and I-3). Table 11 gives an indication of the change in principal fish species landed in the Monterey Bay area since 1947.

There are no significant kelp beds in Monterey Bay proper, that is, between Pt. Pinos and Soquel Point, except for a few associated with the sandstone reefs around Soquel Point. Most of the important kelp beds are north of Santa Cruz and off Pt. Pinos and southward to Point Lobos.

Biological Resources

Vegetation. There are diverse vegetation types in the study area. Many of the native plants are extinct or near extinction (See Table 12). These have been supplanted by introduced species from Europe and Asia which are so widespread (i.e., wild oats, various thistles and other grasses) that they are considered naturalized.

Vegetation will be discussed here in terms of vegetative cover types. (A cover type is an assemblage of plants with a characteristic species composition and arrangement.) The vegetative cover types found in the study area (Figure 26) are briefly described below.

Coastal Dunes. There are coastal dunes along the central and southern edge of Monterey Bay from Moss Landing to Seaside. Shifting sand dunes just behind the beach have *prostrate* and succulent plants, while dunes farther inland have more erect woody plants. The prostrate plants form a low, fairly continuous mat in some locations, while in other spots they exist as small islands on the open sand. The woody plants of the rear dunes normally range from 2-4 feet in height and often form a dense cover, nearly obscuring the dune itself. Dune vegetation is fragile; it is easily damaged by foot travel, as well as by construction.

Table 11

HISTORICAL TREND IN COMMERCIAL FISH *LANDINGS* -- MONTEREY REGION

Fish	Pounds Per Year 1947	1962	1968	1971
Anchovy	15,495,816	1,188,097	8,501,799	2,409,040
Cabezone	2,832	1,920	9,678	
Flounder	64,654	38,505	59,764	16,600
Halibut	135,378	47,181	79,340	45,004
Herring	923,224	492,825	304,634	207,550
Kingfish	195,227			
Lingcod	64,192	101,428	71,318	264,299
Mackerel, jack	2,153,019	2,049,729	960,612	163,673
Mackerel, Pacific	373,892	6,287		
Perch	49,349	25,977	13,727	27,984
Pompano, California	137,381	562	71,748	3,786
Rockfish	1,521,275	2,854,868	2,394,655	2,398,283
Sablefish	162,902	404,628	1,329,969	1,195,077
Salmon	738,469	308,369	572,605	270,772
Sanddab	51,003	127,863	172,631	88,023
Sardine	36,773,189	2,591,518	1,280	
Sea bass, black	249		66	
Sea bass, white	26,057	2,400	14,999	
Shark	781,558	60,488	60,620	
Smelt	111,180	75,691	49,317	18,843
Sole	421,756	526,920	903,043	717,690
Swordfish	521			
Tuna, albacore	1,272,410	2,685,605	1,421,311	10,335,870
Turbot	4,746	70	85	
Miscellaneous fish	1,045	122,502	943	

Crustacean	1947	1962	1968	1971
Crab	51,851	12,458	1,215	
Shrimp	1,687			
Prawn		694	7,239	11,747

Mollusk	1947	1962	1968	1971
Abalone	148,736	125		
Clam, gaper	2,656	480		
Clam, Pismo	2,438			
Mussel	530			
Octopus	7,401	61	381	
Oyster, giant Pacific		31,668		
Squid	14,443,859	5,652,857	14,578,091	16,646,423
GRAND TOTAL	76,132,076	19,630,286	31,863,143	34,820,664

Source: California Department of Fish and Game, 1949, 1964, 1970, 1973.

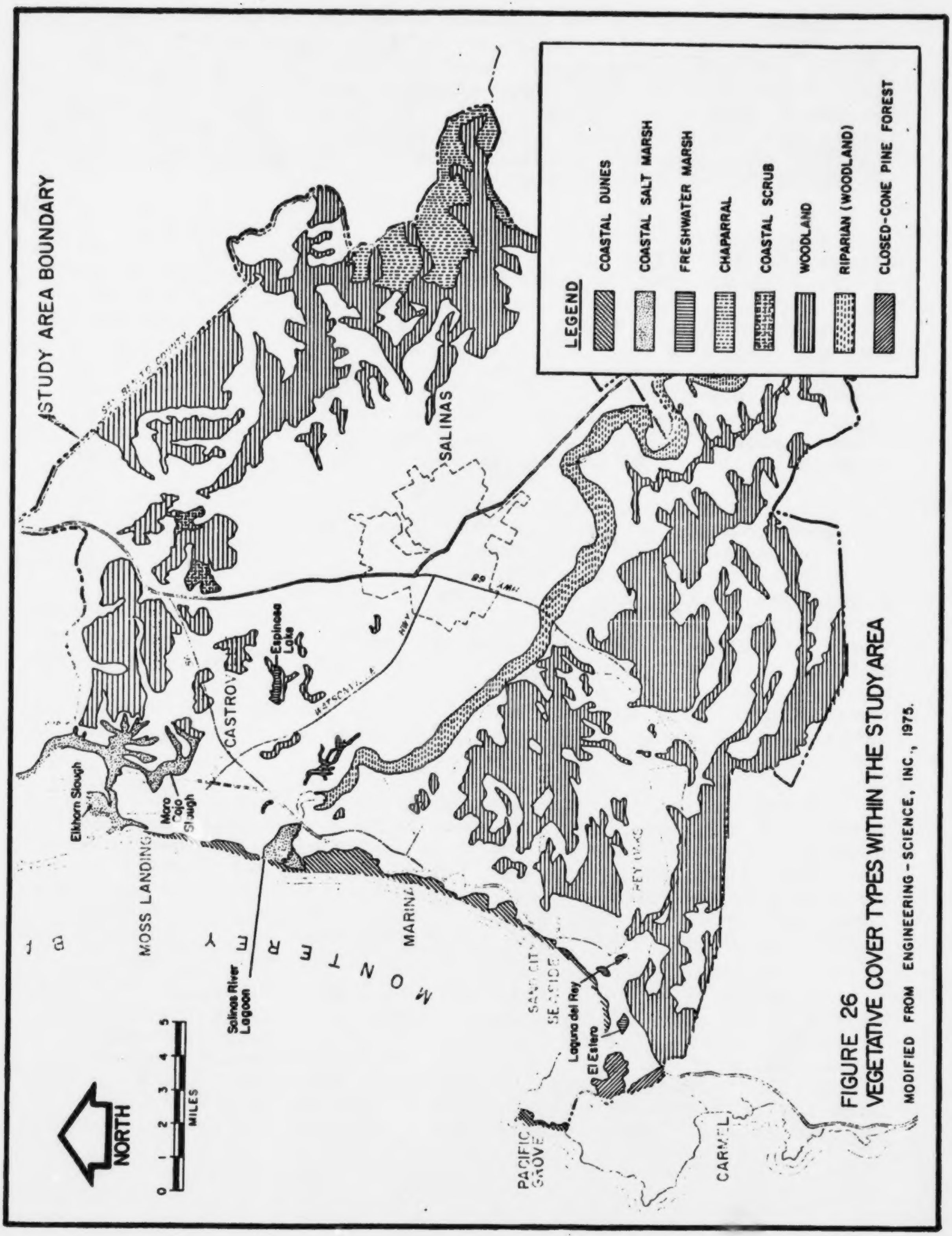

STUDY AREA BOUNDARY
SAN BENITO COUNTY
SALINAS
CASTROVILLE
Espinosa Lake
WATSONVILLE
HWY 89
MOSS LANDING
Elkhorn Slough
Moro Cojo Slough
Salinas River Lagoon
MONTEREY BAY
MARINA
DEL REY OAKS
SAND CITY
SEASIDE
Laguna del Rey
El Estero
PACIFIC GROVE
CARMEL
NORTH
0 1 2 3 4 5
MILES
LEGEND
COASTAL DUNES
COASTAL SALT MARSH
FRESHWATER MARSH
CHAPARRAL
COASTAL SCRUB
WOODLAND
RIPARIAN (WOODLAND)
CLOSED-CONE PINE FOREST

FIGURE 26
VEGETATIVE COVER TYPES WITHIN THE STUDY AREA

MODIFIED FROM ENGINEERING-SCIENCE, INC., 1975.

Common plants in the foredune area are silky beach pea (Lathyrus littoralis), sea rocket (Cakile edentula ssp. californica and Cakile maritima), sand verbena (Abronia maritima), New Zealand spinach (Tetragoma expansa) and various species of ice plant (Mesembryanthamum spp.). Coast eriogonum (Eriogonum latifolia), marram grass (Amophila arenaria), blue beach lupine (Lupinus chamissonis), and mock heather (Haplopappus ericoides) are found in the rear dune areas.

Salt Marsh. There is coastal salt marsh in Elkhorn Slough, to a limited extent in Moro Cojo Slough, and in portions of the Salinas River channel from the Highway 1 Bridge to the Pacific Ocean. Before the mouth of the Salinas River moved from Elkhorn Slough to south of the slough, both Elkhorn and Moro Cojo Sloughs were probably seasonal freshwater marshes with extensive tidal intrusion only during dry months or dry years. Moro Cojo Slough, blocked by a tide gate at the Highway 1 Bridge, is now primarily a brackish water marsh, while Elkhorn Slough is a marine estuary or lagoon, with freshwater marsh only at the inland margin, where overland runoff enters.

There are about 1,440 acres of salt marsh in Elkhorn Slough (Browning, et. al., 1972). The littoral zone (subject to tidal submergence) is a tidal mudflat, with no vegetation right next to the slough. There are extensive areas of perennial pickleweed (Salicornia spp.), comprising over 90 percent of the vegetation. (Browning, et. al., 1972). In higher marsh fringes where tidal inundation is rare, salt grass (Distichlis spicata) and Frankenia (Frankenia grandifolia) occur. These species form a low, dense mat of vegetation along and in between the small tidal sloughs that periodically overflow and inundate most salt marshes. Eel grass (Zostera marina) grows in a few locations in the harbor and mouth of the slough.

There is about 63 acres of salt marsh along a 1-1/2 mile stretch of the lower Salinas River between the ocean and the Highway 1 bridge. The largest contiguous piece is located near the coast immediately south of the river; it is presently part of a California Department of Fish and Game Wildlife Area. The remainder is a thin band upstream toward the bridge. Dominant plant species are pickleweed and salt grass.

Freshwater Marsh. There are small areas of freshwater marsh in the study area around springs, ponds and streams, especially at Espinosa Lake, Laguna del Rey, El Estero, Salinas River, Bennett Slough, and upper portions of Elkhorn and Moro Cojo Sloughs. Freshwater marsh environments were more common in Elkhorn and Moro Cojo Sloughs before the change in the course of the Salinas River. Common plants found in these freshwater marshes are common tule (*Scirpus acutus*), bulrush (*Scirpus californicus*), cattail (*Typha* spp.) and sedge (*Carex* spp.). The tall, slender cattails and tules form dense stands on the perimeter of permanent standing water; heights of 6 to 8 feet are not uncommon for these species.

A small, shallow, fresh-to-*brackish* pond with a relatively stable water level lies south of the salt marsh near the mouth of the Salinas River in the California Department of Fish and Game Wildlife Area. The source of this water is not known. Vegetation surrounding the pond is primarily pickleweed and salt grass. This has been historically and continues to be a waterfowl hunting area.

Chaparral. Chaparral plant communities form dense masses of vegetation on dry gravelly slopes in the foothills of the Gabilan Range east of Salinas. The broad-leafed, woody species that make up this community range in height from 3-6 feet or more and often form a thick, nearly impenetrable barrier to foot travel. Characteristic plants are chamise (*Adenostoma fasciculatum*), manzanita (*Artostaphylos* spp.) and toyon (*Heteromeles arbutifolia*). This vegetation type has been cleared in many locations to provide more open grassland for cattle grazing.

Coastal Scrub. This vegetative type grows on dry gravelly slopes in the northern portion of the study area near Prunedale. It often forms dense stands similar to chaparral, but is considerably lower in height, with smaller, less rigid trunk and branches. Characteristic plants are coyote bush (*Baccharis pilularis*), coastal sage (*Artemisia californica*), black sage (*Salvia mellifera*), blackberry (*Rubus vitifolius*), and bush monkey flower (*Mimulus aurantiacus*). Some chaparral species such as manzanita and chamise may also be intermixed with the coastal scrub.

Woodland. The woodland plant cover type is found throughout the study area, and its most characteristic plant is the oak (*Quercus* spp.). Woodland areas range from nearly continuous, dense stands of oaks with little *understory* vegetation to open "oak parkland" with scattered brush or grassland beneath and between the trees. Different species of oak are found, depending on local soil and climatic conditions. Principal species are the blue oak (*Quercus douglasii*), black oak (*Q. kellogii*), valley oak (*Q. lobata*), coastal live oak (*Q. agrifolia*), and interior live oak (*Q. wislizeni*). The blue oak and interior live oak are found primarily on the west slopes of the Gabilan Range. The black oak are common in the south Monterey Bay area.

Valley oak are most common on the floor of Salinas Valley, but they also grow on the slopes of the Gabilan Range. Along northern Monterey Bay near Castroville and Moss Landing the coastal live oak is the predominant oak species. The range of these species is not definite and there are many areas of overlap. Brush species such as buckthorn (Rhamnus californicus), buckbrush (Ceanothus cuneatus), yerba santa (Eriodictyon californicum), and poison oak (Rhus diversiloba) are often found associated with oak woodland, as are trees such as buckeye (Aesculus californica) and California laurel (Umbellularia californica).

Riparian Woodland. This cover type is found along watercourses and in canyons where there is natural seepage. The principal area of riparian land occurs along the Salinas River.

Riparian habitat along the Salinas River often has a tall overstory of trees with an understory of shrubs and herbaceous vegetation. However, there are areas more singularly composed of shrubs or herbaceous vegetation. (The vegetative composition of the riparian community is shown in Table H-1). The California Department of Fish and Game has studied and catalogued the vegetation into subtypes along the Salinas River in Monterey County. Vegetative subtypes and acreages of these subtypes found from the Chualar Bridge to the Pacific Ocean (24 linear miles) are listed in Table H-2. A Department of Fish and Game survey indicates there is an average of 102 acres of riparian vegetation per mile along the Salinas River.

Riparian areas, once more extensive and widespread along the Salinas River, are now confined to the stream channel and in most cases within the levee system. In most sections of the river, the riparian woodland is less than 300 feet wide on either side of the river.

Closed-Cone Pine Forest. Closed-cone pine forest is limited in the study area, occurring only at Pacific Grove and certain other planted areas. The stands are frequently dense with little understory vegetation, the trees range from 30 to over 100 feet in height. The principal closed-cone species is the Monterey pine (Pinus radiata). The Del Monte Forest (which borders Pacific Grove on the south) contains several species of plants restricted to the area, i.e., gowen cypress and bishop pine. These species and others are described under "Rare and Endangered Plants". Plants representative of the closed-cone pine forest are Monterey cypress (Cupressus macrocarpa) and coast live oak (Quercus agrifolia).

The California Natural Areas Coordinating Council has designated specific locations throughout the state as natural areas significant for their scientific or educational interest or as representative of California's native biotic communities. Monterey County has a large number of these natural areas; those within the study area are summarized below (California Natural Areas Coordinating Council, 1975):

Asilomar State Beach - a 96-acre site (USGS 7-1/2' quad, Monterey; 37°30'N, 121°56'20"W) of over one mile of shoreline supporting several coastal and inland habitats. The dunes are "probably the best remaining example of the dune vegetation that was once prevalent on the Monterey Peninsula."

Elkhorn Slough - a 2,500-acre marsh and slough (USGS 7-1/2' quads, Moss Landing and Prunedale; 36°48'50"N, 121°45'W) representing one of the largest remaining wetlands on the coast. Over 90 species of birds and 70 species of fish have been found in the area, including the endangered California clapper rail, California brown pelican and California least tern.

Ft. Ord Dunes - a 1,000-acre sand dune area (USGS 7-1/2' quad, Marina; 36°38'N, 121°49'W) along the coast that supports several rare plant species and a variety of native plants that are unique to the Monterey Bay area.

Ft. Ord Botanical Reserves - there are nine separate areas within the confines of Ft. Ord Military Reservation (USGS 7-1/2' quad, Seaside) that support botanical complexes of particular interest. All of the protected reserves contain unique and/or rare plant species. The plant complexes offer some of the best remaining examples of the vegetation that existed along Monterey Bay prior to man's intervention.

Monterey County Airport and Vicinity - a 300-acre site (USGS 7-1/2' quad, Seaside; 36°35'N, 121°50'W) south of the airport that was once one of the "richest" floristic areas on the Monterey Peninsula. It now supports a number of rare plants.

Moro Cojo Slough - a 600-acre freshwater marsh and estuarine area (USGS 7-1/2' quad, Moss Landing; 36°47'30"N, 121°46'W), similar to Elkhorn Slough, but with more freshwater influence. The slough is an excellent area to study life form transitions from estuary to freshwater marsh.

Pacific Grove Monarch Butterfly Trees - a 1/4-acre site (USGS 7-1/2' quad, Monterey; 36°37'20"N, 121°56'W) that contains the best known of the trees that support the swarms of monarch butterflies that winter at Monterey.

These natural areas have received no special legal status or protection to date, but are considered a resource of statewide critical concern by the State Office of Planning and Research.

Rare and Endangered Plants. Twenty-one rare and endangered plant species have been identified within the study area boundaries (see Table 12). Their general location has been identified on USGS topographic maps available at the California Native Plant Society office, Davis, California, or at Jones & Stokes Associates, Inc., Sacramento, California. Those species included on the U. S. Department of Interior's proposed list of endangered vascular plants are identified on Table 12.

In some cases, plant identification has been based on pre-1945 specimens and localities. Locations have been verified in many cases; however, changes in land use since 1945 may have affected distribution and occurrence of some species.

Some of these plants, such as Eastwood's ericameria and Santa Cruz and Hickman's cinquefoil, appear to be in imminent danger of extinction, while others, such as the Tidestrom lupine, Pacific Grove clover, Monterey clover, gowen cypress, and Monterey cypress appear to be stabilizing or increasing in numbers. Other plants appear to be declining in vigor and are endangered in at least part of their range. All 21 plant species are endemic to (occurring only in) California.

Many of the rare and endangered plants found in the Monterey Peninsula are located on private and public lands where they are protected against development and human encroachment.

Wildlife. Because of the diversity of plant life and the variety of habitats found in the study area, a wide variety of animal life exists. A habitat is the place where an animal or plant normally lives. Each habitat (ocean coast, salt marsh, freshwater marsh, grassland, chaparral, woodland and forest) supports various wildlife species. Some species are restricted to one habitat, while others are found in several habitats. (Common wildlife species of the study area are listed in Appendix H.)

Along the ocean coast, birds are the most evident form of animal life. Gulls, terns, murres, cormorants, pelicans and shore birds are common. The lack of significant shallow coastal areas keeps offshore bird population densities down and restricts use by bottom feeding waterfowl, however. Marine mammals, such as the southern sea otter and stellar sea lion, are often seen in Monterey Bay. The breakwater at

Table 12

VERY RARE AND RARE AND ENDANGERED PLANTS FOUND IN THE STUDY AREA

Common Name	Scientific Name	Rarity Code* R	E	V	D	Habitat & Plant Community	General Location in Study Area
✓ Hickman's onion	Allium hickmanii	2	2	1	3	Grassy places, closed-cone pine forest	Monterey peninsula
Monterey manzanita	Arctostaphylos montereyensis	2	1	1	3	Sand dunes and woods, closed-cone pine forest	Near Seaside and south of Spreckels
✓ Sandmat manzanita	A. pumila	2	2	2	3	Sand hills and woods, coastal shrub and closed-cone pine forest	Near Seaside, Monterey peninsula, west of Marina
Monterey ceanothus	Ceanothus rigidus	2	2	1	3	Sandy hills and flats, coastal shrub and closed-cone pine forest	Near Prunedale, Marina, Seaside, Monterey peninsula and south of Spreckels
Seaside bird's-beak	Cordylanthus littoralis ssp. littoralis	3	2	1	3	Coastal strand and closed-cone pine forest	Near Salinas, Seaside, Moss Landing and west of Marina
✓ Gowen cypress	Cupressus goveniana	3	1	1	3	Dry slopes, closed-cone pine forest	Monterey peninsula
Monterey cypress	C. macrocarpa	3	1	1	3	Exposed headlands and dry places, closed-cone pine forest	Monterey peninsula
Hutchinson's delphinium	Delphinium hutchinsonae	2	2	1	3		Monterey peninsula and south of Spreckels
Pinnacles buckwheat	Eriogonum nortonii	2	2	1	3	Dry rocky slopes, chaparral	Near Fremont Peak, Gabilan Mountains
Temblor buckwheat	E. temblorense	2	1	1	3		West of Marina
Coast wallflower	Erysimum ammophilum	1	2	1	3	Coastal strand	West of Marina
Menzies wallflower	E. menziesii	2	2	2	3	Sand dunes, coastal strand	Monterey peninsula
✓ Eastwood's ericameria	Haplopappus eastwoodiae	2	3	3	3	Coastal sand dunes, coastal strand	Near Seaside, Monterey peninsula and west of Marina
✓ Santa Cruz tarweed	Holocarpha macradenia	3	2	2	3	Heavy soils and grassy flats, coastal shrub	Near Prunedale
✓ Tidestrom lupine	Lupinus tidestromii var. tidestromii	3	3	1	3	Coastal strand	Monterey peninsula
✓ Carmel Valley bush-mallow	Malacothamnus palmeri var. involucratus	2	2	1	3	Dry rocky slopes, chaparral	South of Spreckels
Gairdner's yampah	Perideridia gairdneri ssp. gairdneri	2	2	2	3		Monterey peninsula
✓ Hickman's cinquefoil	Potentilla hickmanii	3	3	2	3	Freshwater marsh	Monterey peninsula
✓ Monterey knotweed	Polygonum montereyense	PE			3	Dry-hard clay	Monterey peninsula
✓ Pacific Grove clover	Trifolium polyodon	3	3	1	3	Closed-cone pine forest	Monterey peninsula
✓ Monterey clover	T. trichocalyx	3	3	1	3	Sandy places, closed-cone pine forest	Monterey peninsula

* DEFINITION OF STATUS CODES:

Rarity (R)
1. Rare, of limited distribution, but distributed widely enough that potential for extinction or extirpation is apparently low at present.
2. Occurrence confined to several populations or one extended population.
3. Occurs in such small numbers that it is seldom reported; or occurs in one or very few highly restricted populations.

PE Possibly extinct or extirpated.

Endangerment (E)
1. Not endangered.
2. Endangered in part.
3. Totally endangered.

Vigor or Population Trend (V)
1. Stable or increasing.
2. Declining.
3. Approaching extinction or extirpation.

General Distribution (D)
1. Not rare outside California.
2. Rare outside California.
3. Endemic to California.

✓ Species included in the U. S. Department of Interior's proposed endangered vascular plants list (Federal Register, Vol. 41, No. 117, June 16, 1976).

Sources: California Native Plant Society, 1974; Munz and Keck, 1959; and Munz, 1968.

Monterey Harbor attracts a herd of 50 or more sea lions every year; this is one of the largest concentrations in the Monterey Bay area. Sea otters are also found in the harbor, but the main population is located further south along the coast. Smaller mammals such as blacktailed jack rabbits, brush rabbits, microtine mice, and kangaroo rats are also present. Invertebrate species and other marine life are discussed in more detail in the Monterey Bay Environment section.

Salt marsh habitats are important wildlife areas. Here, too, bird life is conspicuous. During the height of the bird migratory period (early fall to early spring), hundreds of shore birds, wading birds, marsh birds, waterfowl, predatory birds, and ocean-dwelling birds are found in Elkhorn Slough. Over 90 species of birds have been observed in the area. Some species are resident, many are migratory. The California clapper rail, an endangered species, is a resident of Elkhorn Slough. The large, contiguous expanse of associated marsh makes Elkhorn Slough one of the most valuable wildlife areas along California's central coast. Accordingly, the California Department of Fish and Game, the California Coastal Commission and the U. S. Fish and Wildlife Service have all recommended it be permanently preserved as wildlife habitat.

Mammals are not abundant in the marsh but are common in the chaparral and woodland areas around the marsh fringes.

The salt marsh and lagoon at the mouth of the Salinas River is also a valuable wildlife area, but is somewhat smaller than Elkhorn Slough. The brown pelican, an endangered species, is a common visitor to the Salinas River lagoon. During a field investigation of the area (October 14, 1975), approximately 30 brown pelicans were observed as well as marsh hawks, white-tailed kite, Heermann's gull, western gull, ring-necked pheasant, mourning dove, ruddy duck, American coot, horned grebe, sanderling, plover and willet. Habitat for the clapper rail, an endangered species found in Elkhorn Slough, is also present in the salt marsh at the mouth of the Salinas River, but the clapper rail has not been observed there. This marsh, the surrounding sand dunes, and upland areas are part of a California Department of Fish and Game Wildlife Area.

Freshwater marsh habitat is also valuable for wildlife. Small marsh areas provide drinking water for birds and mammals as well as nesting and cover habitat for many other wildlife species. Commonly observed marsh birds are blackbirds, wrens, wading birds, waterfowl, mud hens, and numerous song birds. Mammals present include raccoon, opossum, and brush rabbits. Amphibians and reptiles are represented by snakes, frogs, newts and salamanders.

Oak woodland and grassland habitat is widespread throughout the study area. Grasslands are important foraging areas for many forms of wildlife. Predatory birds such as hawks, owls and falcons are often seen in grassland areas. Other commonly observed birds are meadowlark, robin, sparrow, mourning dove and horned lark. Mammals include predatory coyote and fox, as well as jackrabbits, mice, gophers, ground squirrel and wild boar.

Oak woodland is often associated with grassland and brush areas. Some woodland is open with a grass understory, while other areas are intermixed with brush and shrubs. The oak trees provide food and shelter for many species of wildlife. Acorns (oak mast) are important food for black-tail deer, gray squirrels and various bird species. The trees also provide nesting cover for some birds.

Chaparral habitat, which occurs predominantly on the western slopes of the Gabilan Range, supports a moderately high black-tail deer population. For the county as a whole, deer densities in chaparral are estimated to be 10-30 animals per square mile. In oak-grassland, which provides the best deer habitat in the county, densities are estimated to be 30-60 animals per square mile (California Department of Fish and Game, 1965). Brush rabbit, coyote, fox, mountain lion, ground squirrel, and various mice are also abundant in the chaparral areas. Bird life includes wrens, sparrows, towhees, bushtit, valley quail, mourning dove and turkey vulture.

The small amount of pine forest habitat on the Monterey Peninsula supports many bird species including nuthatch, creeper, Steller's jay, waxwings and other song birds. Gray squirrels and black-tailed deer are mammals found in the pine forest. The close proximity of urbanization and limited extent of the habitat type have restricted its value for wildlife.

Riparian woodland is one of the most valuable wildlife habitat types because of its intermixed tall trees, brush and herbaceous vegetation and the close proximity of water. The Salinas River is the most extensive section of riparian woodland in the study area. The shrubs provide ground cover for song birds, quail, dove and small mammals such as rabbits, hares, mice, ground squirrels, coyote, fox and deer. The larger trees, including those that are dead or dying, provide nesting spots for many birds (hawks, owls, woodpecker, etc.) and gray squirrels. Riparian habitat bird populations and species diversity are second only to those of the study area's salt marshes.

Rare, Endangered and Threatened Wildlife. There are ten species of wildlife that are considered rare, endangered or threatened whose range includes (or may include) the study area. These species are listed in Table 13.

According to the California Department of Fish and Game (1974), a species which is considered "endangered" is one whose prospect for survival and reproduction is in immediate jeopardy. Its peril may result from one or many causes -- loss or change in habitat, overexploitation, *predation*, competition, or disease. Without help and protection, an endangered species would probably become extinct. A "rare" species is one that, although not presently threatened with extinction, exists in such small numbers throughout its range that it may become endangered if its numbers are further reduced, its range reduced or its habitat destroyed. The federal definition of endangered species is "those species in danger of extinction throughout all or a significant portion of their range"; threatened species include "those species which are likely to become endangered within the foreseeable future throughout all or a significant portion of their range" (The Endangered Species Act of 1973, PL 93-205; 87 Stat. 884). Endangered species are so designated by being listed in the Federal Register.

The California least tern, California clapper rail and California brown pelican are known to occur around Elkhorn Slough. The California clapper rail is a resident of the Elkhorn Slough (Browning, et.al., 1972) and may occur in the Salinas River lagoon. The brown pelican and least tern are both migrant species found in the area in summer months. Brown pelicans are often observed on salt ponds along the north side of Elkhorn Slough and in the Salinas River lagoon.

The California yellow-billed cuckoo, once found throughout California in riparian habitat, is now rare. This species may be present in riparian habitat along the Salinas River.

The American peregrine falcon and southern bald eagle are transient species and could occur in the study area during the winter months.

The southern sea otter (Enhydra lutris), although not presently included on state rare or endangered species lists, was recently listed as a threatened species by the U. S. Fish and Wildlife Service (January 10, 1977, Federal Register). The otter is commonly observed in Monterey Bay, often near the wharf area. The main otter population is centered south of the study area below Carmel. However, the population is expanding and animals are moving north and south along the coast, reoccupying much of their former range.

Table 13

RARE, ENDANGERED AND THREATENED WILDLIFE SPECIES

Common Name	Scientific Name	Status	Study Area Distribution and Habitat
		Insects	
Smith's blue	*Shijimiaeoides enoptes smithi*	E*	Coastal sand dunes from Seaside to Marina.
		Amphibians	
Santa Cruz long-toed salamander	*Ambystoma macrododactylum croceum*	E, T	Occurs in Monterey County north of Moss Landing. Habitat is vernal pools and oak and willow thickets. May occur in freshwater ponds in the Monterey-Marina coastal strip.
		Birds	
American peregrine falcon	*Falco peregrinus anatum*	E, T	Breeds in California along coast.
Southern bald eagle	*Haliaeetus leucocephalus l.*	E, T	Occurs statewide.
California brown pelican	*Pelecanus occidentalis californicus*	E, T	Occurs along California coast from August through November.
California least tern	*Sterna albifrons browni*	E, T	Summer visitor from April through September along California coast. Occurs in Elkhorn Slough.
California clapper rail	*Rallus longirostris obsoletus*	E, T	Resident of salt marshes, including Elkhorn Slough.
California black rail	*Laterallus jamaicensis coturniculus*	R, T	Historically occurred in salt marshes from Tomales Bay south to lower California. May be present in Elkhorn Slough.
California yellow-billed cuckoo	*Coccyzus americanus occidentalis*	R	Historically occurred throughout California. May be present in riparian habitat along the Salinas River.
		Mammals	
Southern sea otter	*Enhydra lutris*	T	California population centered in Monterey County, primarily from Carmel River to Pt. Sur; not considered rare or endangered by California Department of Fish and Game.

R Rare)
E Endangered) designation by California Department of Fish and Game.
T Threatened)
E* Endangered) designation by U. S. Fish and Wildlife Service (endangered species have been officially listed in the Federal Register.)

The Santa Cruz long-toed salamander is known to occur at two locations in southern Santa Cruz County and two locations in northern Monterey County. The status of the Monterey populations is not well established, but the salamander has been observed in both McClusky and Bennett Sloughs (north of Elkhorn Slough). Several ponds along the coast between Monterey and the Salinas River have been identified as potential salamander habitat, but to date populations have not been located in these areas.

The Smith's blue is a small butterfly that occupies the most coastal portions of the sand dunes stretching from Seaside to Marina. Encroachment by urbanization, highway construction and the introduced ice plant (Mesembryanthemum spp.) has nearly eliminated its habitats, especially in the Marina area (Federal Register, Vol. 41, No. 106, Tuesday, June 1, 1976).

Fish. Most fish habitat in the study area occurs in the lower portion of the Salinas River, a few scattered farm ponds, and the upper reaches of several streams in the Gabilan Range. At the turn of the century, the Salinas River supported a large salmon and steelhead population. However, overharvesting, reduction of river flow and destruction of spawning areas have eliminated the salmon population and significantly reduced the steelhead population. The reduction in river flows is the direct result of man's diversion and storing of normal runoff for agricultural, industrial and domestic use. Nacimiento and San Antonio Dams are the most recent storage structures, but agricultural withdrawals reduced flows in the lower river long before construction of the dams. Spawning areas have been destroyed by gravel extraction and the lack of spring flows in sufficient quantity to wash silts and sands from the gravel bars. The present Salinas River fishing resource is confined to the lower river in the vicinity of the Salinas River lagoon. This area is subject to tidal action during the fall, winter and spring months when the sand bar blocking the mouth of the river is removed. Some seawater intrusion through the sand bar and into the Salinas River lagoon occurs during the summer months.

Both freshwater and salt water fish have been found in the Salinas River lagoon (Table H-3). Sturgeon, flounder, top smelt, shiner perch, pipefish and striped bass are marine and *euryhaline* species that move into the lagoon once it is opened to the ocean. These fish may move freely between the ocean and the lagoon while the mouth is open; however, during the summer months a sand bar blocks the mouth of the Salinas River, preventing fish movement. Some of these fish, especially the starry flounder and striped bass, may spawn in the lagoon.

Steelhead trout, once abundant in the Salinas River, now migrate in limited numbers up the river to spawn in small tributary streams over 150 miles from Salinas. Adult steelhead probably enter the river in late fall and winter after the sand bar blocking the river has been removed. Young steelhead remain in the home stream for about a year and descend the river to the ocean in the following spring or fall. Low or absent river flows in the spring and summer could hinder downstream migration of young steelhead.

Striped bass, important game fish throughout the state, occur in the lower Salinas River where there is a minor amount of sport fishing below the Highway 1 Bridge.

The Sacramento hitch, blackfish and squawfish (non-game species) are native to the Salinas River system. Carp, sunfishes (bluegill, green-eared sunfish, black bass and crappie) and catfishes are all introduced warmwater species. The sunfishes and catfishes were introduced to the area in the late 19th century and are now valuable and much sought-after game fish. The present population status of the sunfishes and catfishes in the lower Salinas River is unknown.

The species composition and abundance of the benthic community in the Salinas River lagoon is undocumented. The species present are, for at least part of the year, probably similar to those found in Elkhorn Slough. A baseline study of Moss Landing Harbor/Elkhorn Slough (Nybakken, Cailliet and Broenkow, 1975) found that its benthic community was dominated by three classes, Polychaeta, Mollusca and Crustacea. Capitellids and spinoids comprised the largest part of the polychaete fraction, while certain amphipods and tanaidaceae were the most common crustaceans. Almost all of the molluscs found in the slough were bivalves. The degree of benthic similarity between Elkhorn Slough and the Salinas River lagoon is entirely speculative, however. The entrance to Moss Landing Harbor is always open to the ocean; therefore, Elkhorn Slough is constantly influenced by the tides. The lower Salinas River is often shut off from the sea by a sand bar. A literature survey and personal communication found no reference to benthic studies in the Salinas River lagoon.

Existing Cultural Environment

Population

Existing population and future population trends relating to age, income and household organization are important in planning wastewater facilities.

TABLE 14

Historical Population in the Study Area & Its Region, 1930-1970

	1930	1940	1950	1960	1970	% Increase 1930-1970
Monterey County, Total	53,700	73,000	130,500	198,400	250,100	365
inside study area*	40,000	51,200	91,000	150,500	187,200	370
outside study area	13,700	21,800	39,500	47,900	62,900	360
San Benito County	11,300	11,400	14,400	15,400	18,200	60
Santa Cruz County	37,400	45,100	66,500	84,200	123,800	230
Regional Total	102,400	129,500	211,400	298,000	392,100	280

*Allocation of Monterey County total to areas inside and outside study area in 1930, 1940 and 1950 is approximate.

Source: U.S. Census, 1930-1970

TABLE 15

Change in Population of Incorporated and Unincorporated Areas in the Study Area, 1950-1975

	1950	1960	1970	1975	% Change, 1950-1975
Del Rey Oaks	uninc.	1,831	1,823	1,760	---
Marina	uninc.	uninc.	uninc.	11,950	---
Monterey	16,205	22,618	26,302	29,250	+80
Pacific Grove	9,623	12,121	13,505	16,800	+75
Salinas	13,917	28,957	58,896	68,600	+393
Sand City	uninc.	uninc.	212	210	---
Seaside	uninc.	19,353	35,935	33,950	---
Uninc. Areas	51,255	65,620	50,527	29,980	-42
TOTAL	91,000	150,500	187,200	192,500	+112
Uninc. Areas as Percent of Total	56%	44%	27%	16%	

Source: U.S. Census, 1950-1970; Calif. Dept. of Finance estimate, 1975.

Population in the Monterey Peninsula and the lower Salinas Valley has increased substantially in recent years. Three-fourths of Monterey County residents live in the study area. Monterey County has grown considerably more than neighboring counties over the past 40 years (see Table 14).

Table 15 illustrates a decline of population in unincorporated areas and the trend to urbanization. Though there are exceptions, there has been a decline in the proportion of the population under 18 and a rise in the proportion over 65 (see Table J-1). Figures also suggest a larger number of young adults. These changes are reflected in the number of households, which are increasing relatively faster than the population: widows and widowers often represent a single-person household. Lower fertility rates and the tendency of young women to marry later have also made the average household size drop. In 1960, Monterey County had 3.24 persons per household; in 1970, 3.11. In the City of Monterey, average household size fell from 3.03 to 2.72 persons. Ft. Ord expects occupancy of 2.2 persons per unit in its projected 1,000 units. Operation as a divisional headquarters will require more off-base housing. (Forecasts of military populations are, of course, subject to rapid change.) Since more housing units are needed to house these smaller families, public facilities planning is affected.

Such planning must also consider median income, since the affluence of the population is related to its capacity for public expenditure. The study area's median income figures are lower than those of the state as a whole, though they do reflect a rising trend typical of the urbanization taking place (Table J-2).

Population Projections

Growth within the study area is expected to be 60 to 80 percent between 1970 and 1995, a net gain of about 148,000 people (based on local government 1995 projections). Many factors tending to accelerate growth or restrain growth are considered in such projections. The State Department of Finance (DOF) regularly prepares and updates county forecasts, and the State Water Resources Control Board (SWRCB) adapts them to its jurisdictions. This forecast is presented (Table 16 and Figure 27) with two others, those of local jurisdictions in the Monterey Peninsula Water Pollution Control Agency and the Monterey County Transportation Study (MCTS). Possible double counting problems (anticipating annexations) may have inflated the local forecast total. The MCTS figures do not involve double counting and are considered more accurate by local planners.

Table 16

POPULATION FORECASTS FOR STUDY AREA

	AMBAG[1] Planning Area	1970 Census[2]	SWRCB Allocation of DOF 1995 D-100 Projection[3]	MCTS 1995 Projection[4]	Most Recent 1995 Projection by Local Jurisdictions[5]
Castroville	32,33	9,342	21,556	25,000	29,000
Marina	34	9,770	15,724	22,500	19,650
Fort Ord	35	31,128	42,201	30,400[8]	22,500
Monterey-Salinas	36	1,202	1,486	12,600	18,300
Salinas South, San Juan and Gabilan	37,38,39	8,103	21,464	10,990	29,500
Salinas	40	61,969	103,361	109,000	107,650
Toro	41	3,858	13,129	12,150	22,100
Seaside Sanitary District	42	22,200	23,115	29,000[6]	34,550
Monterey	43	26,329	35,764	33,300[7]	33,300
Pacific Grove	44	16,705	26,341	22,100	21,750
TOTAL		190,606	304,141	207,040	338,300

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[1] Association of Monterey Bay Area Governments; boundaries are approximate.

[2] Allocated to sanitary service area by Engineering Science, Inc. and tabulated in Engineering Science, Inc., 1975. Page II-41.

[3] Interpolated from State Water Resources Control Board data in Engineering Science, Inc., 1975.

[4] Monterey County Transportation Study, 1973a. The differences between MCTS and SWRCB figures appear to arise from boundary differences. The differences between MCTS and local forecasts appear to arise from double-counting; that is, areas likely to be annexed to incorporated cities between now and 1995 may have been counted in the local totals of both cities and unincorporated areas.

[5] Calculated from data supplied by William Maddaus, Engineering Science, Inc., pers. comm.

[6] Includes Seaside and Sand City.

[7] Includes Del Rey Oaks (2300).

[8] 15,000 added to original MCTS forecast, based on personal communication with MCTS staff.

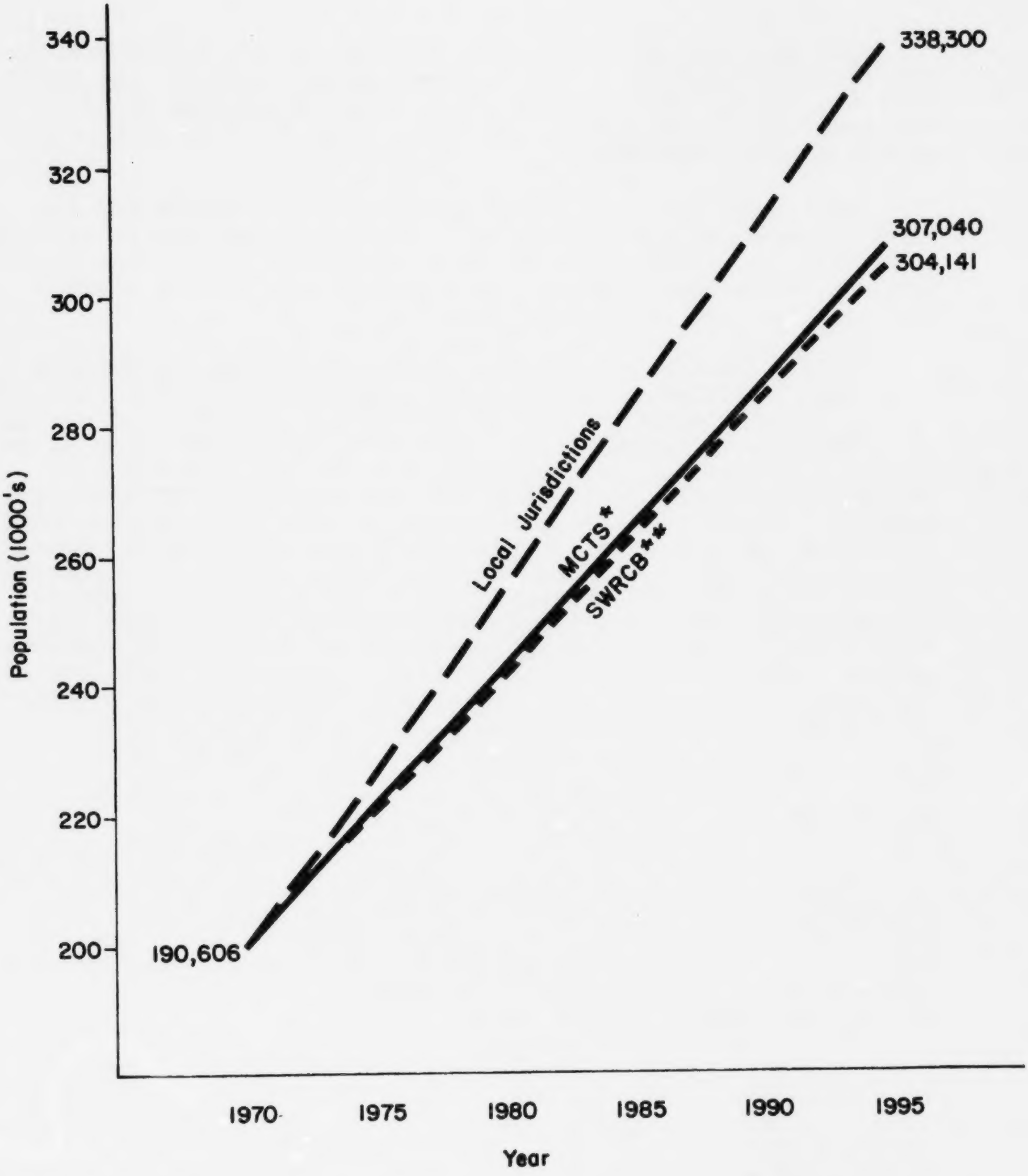

FIGURE 27 STUDY AREA POPULATION FORECASTS

* Monterey County Transportation Study.
** California State Water Resources Control Board.

Source: Table 16.

The military population is included in the SWRCB forecast, but was not included in the original MCTS forecast; the MCTS says the future Ft. Ord population which should be added to its total is 15,000 making the MCTS total 307,040, very close to the SWRCB's 304,141.

Different boundary lines selected by the SWRCB and the MCTS account for the variation in their figures for individual communities. Differences in forecasts which still remain when project facilities planning is finished will be discussed in the impacts section of this report.

Neither the state nor the local population projections have been modified to account for possible resource constraints (i.e., water shortages, energy shortages) or increased government control of growth (i.e., restrictions on provision of new public services for air and water quality maintenance or financial reasons; restriction of development in agricultural areas). Any of these factors could at some time in the future influence the course of population growth in the study area, but neither the likelihood nor the impact of these constraints can be determined at present. The water supply shortage on the Monterey Peninsula is already affecting growth rates in that area, but the duration and ultimate effect of the shortage is not known. If similar restraints continue to operate within the study area, actual population may turn out to be somewhat less than projected population.

Economics

Types of Economic Activities. The economic life of the region is dominated by agriculture, especially in the lower Salinas Valley, and by tourism, especially on the Monterey Peninsula. A third significant source of income from outside the region is the presence of a number of military establishments, of which Ft. Ord is the largest.

The importance of agriculture in the region's economy was discussed in the section on Land Use. Table J-6 presents data on the value of major crops in the lower Salinas Valley. In constant 1975 dollars, the value of those crops almost tripled between 1950 and 1975. This source of income is also important to those in agriculture-related industries (such as food processing) and to still others in retail and service occupations who provide goods and services for agricultural workers. Figures suggest that agricultural expansion in the county has not yet leveled out, and continued growth is possible.

The Monterey Peninsula Chamber of Commerce estimated 1973 revenues from tourism to be over $160 million. Most tourist expenditures are made not inland but on the peninsula, principally in Monterey, and, outside the study area, Carmel. According to State Board of Equalization figures, per capita sales at eating and drinking establishments in Monterey were $574.02 in 1970, compared to a state average of only $213.62.

Fort Ord, the area's largest military installation, had a 1972 payroll of $150 million. The total military payroll was over $154 million. The same year, the Department of Fish and Game estimated the value of commercial fish landings at the Port of Monterey as about $1.6 million (Engineering Science, Inc., 1975).

Employment. Changes in employment reflect changes in the regional economy. Table 17 presents state data on employment by industry over the years since 1950. (Reporting methods undercount agricultural employment, and undercounted government workers until 1958. Carmel, outside the study area, was included in the study.)

These figures reflect general employment categories of the region, and show that there has been an employment increase of about 140 percent in twenty years' time. The finance, insurance, and real estate sector as well as the service sector grew slightly faster than the total; manufacturing grew at the same rate as the total; government employment since 1960 has almost doubled; other sectors lagged behind.

It should be remembered that growth in such categories as transportation, communication, and utilities is likely to be related to agriculture, a basic activity of the region. Service employment is related to tourism, the other prominent regional industry.

Civilian employment in Salinas-Monterey-Carmel area in 1970 was estimated at about 68,000 persons (Table 17). Total employment in Monterey County was reported at near 100,000 (U. S. Census) in 1970.

As might be expected from the nature of regional occupations, 96 percent of Monterey County jobs are held by county residents (U. S. Census). Of Monterey County's out-commuters, more work in Santa Cruz County (37 percent) than anywhere else. Of in-commuters to Monterey County, more live in Santa Cruz County (45 percent) than live in any other county.

TABLE 17

Employment in the Study Area and the Central Coastal Region, 1970 and Projected 1995

Industry Sector	1970 Study Area	1995 Study Area	 Central Coastal Basin
Trade	17,600	18,650	109,900
Services	15,500	22,150	210,950
Government	14,800	24,900	65,700
Agriculture, Forestry & Fisheries	3,400	other non-retail 44,950	22,700
Mining	100		2,200
Construction	3,200		23,800
Manufacturing	7,000		78,400
Transportation, Communication & Utilities	3,300		33,750
Finance, Insurance & Real Estate	2,900		29,550
Total	67,800	110,650	576,950
Column Number	1	2	3

Sources: Column 1, State of California as cited in Table J-3, p. 97; Column 2, Monterey County Transportation Study, 1973a; Column 3, Central Coastal Basin Plan cited in. Engineering-Science, Inc., 1975 (1995 figures interpolated from 1990 and 2000)

Employment Forecasts. Employment forecasts for 1995 are found in the Monterey County Transportation Study (1973a, Table 17). This forecast predicts a gradual decline in agricultural employment and stable mining employment. Military employment is expected to remain stable, and government employment to rise about 25 percent by 1995. Employment in all other industry groups is forecast to double except for services, in which employment is expected to quadruple by 1995. This reflects the view that recreation-oriented and tourist activity in the area will represent an even larger share of the region's economic activity in the future than it does at present.

Public Services and Facilities

Water Supply. The principal demand for water in the study area is for agriculture. Table 18 shows present and future agricultural water demands, and Table 19 urban requirements. In 1970 agricultural demand was 3.8 times domestic and industrial water use. In spite of the large demand, reclaimed water is not now used for crop irrigation.

The majority of the area's water supply is drawn from groundwater. In the Salinas Valley, domestic, industrial and agricultural water is pumped from underground aquifers, either by individual wells or community well fields. Nacimiento and San Antonio Dams, operated in the upper Salinas River watershed by the Monterey County Flood Control and Water Conservation District, are used to regulate runoff into the Salinas River so that as much water as possible percolates to the groundwater. This groundwater recharge program essentially acts as the supply system to the valley's wells. Increases in pumping for both agriculture and urban use have seriously overdrafted the groundwater supply in recent years. This is discussed in more detail in the Introduction and Water Resources sections of the report.

The Cities of Monterey, Pacific Grove, Del Rey Oaks, Sand City and Seaside are supplied by the California American Water Company (CAL-AM), which taps both surface and groundwater. Surface water is taken from the Carmel River at San Clemente and Los Padres Dams. Groundwater is pumped from both the Carmel River Valley and an aquifer below Seaside.

In recent years groundwater withdrawals from the Seaside aquifer have been suspected of causing salt water intrusion. As a result, the California Public Utilities Commission (PUC) has ordered CAL-AM to reduce its pumping in the Seaside area to 2,000 acre-feet/year. This cutback in available water supply has resulted in a ban on new hookups in the entire CAL-AM service area initiated by the PUC.

Table 18

AGRICULTURAL IRRIGATED ACREAGE AND TOTAL WATER DEMAND PROJECTIONS

Year	Irrigated Land (acres)	Irrigated Crops* (acres)	Annual Water Demand (acre-feet)
1970	42,000	56,500	133,100
1975	41,500	60,500	142,200
1985	40,500	68,000	159,700
1995	40,000	72,500	169,900

* Larger than irrigated land due to multiple cropping on same acreage.

Source: Adapted from Task Reports II-2 and II-3 AMBAG Plan (Yoder-Trotter-Orlob & Associates, 1973).

Table 19

URBAN WATER DEMANDS BY PLANNING AREA (acre-feet/year)*

Planning Area	Unit Water Use - Gallons/ Capita/Day**	1970	1975	1985	1995
32 Castroville	145	990	1,200	1,800	2,760
33 Castroville S.D.[1]	545	1,970	2,380	3,660	5,250
34 Marina[1]	125	1,370	1,540	1,920	2,280
35 Fort Ord[1]	175	6,300	6,660	7,450	8,330
36 Monterey-Salinas Highway	160	220	220	250	250
37 Salinas South	180	210	280	260	260
38 San Juan	180	1,280	2,180	3,100	4,330
39 Gabilan	180	140	160	200	290
40 Salinas[1]	180	12,490	13,510	16,990	21,310
41 Toro	180	780	1,050	1,920	3,430
42 Seaside S.D.[1]	95	2,360	2,400	2,210	2,440
43 Monterey[1]	160	4,720	5,110	5,660	6,200
44 Pacific Grove[1]	115	2,150	2,340	2,680	3,000
Sewered Areas Total		31,360	33,940	40,570	48,810
Unsewered Areas Total		3,620	5,090	7,530	11,270
GRAND TOTAL		34,980	39,030	48,100	60,000

[1] Sewered area.

* Based on County Planning Department population projections.

** Calculated by Engineering Science, Inc., from information in Task Reports II-2 and II-3 AMBAG Plan (Yoder-Trotter-Orlob & Associates, 1973).

CAL-AM is currently working on a project to upgrade their well water treatment and increase their capacity to deliver water from the Carmel Valley to the Seaside-Monterey area. The increase in delivery capacity is designed to improve service to existing customers and provide service to additional customers within the existing service area. Transmission capacity is to be increased to 22,000 acre-feet/year (2,000 from Seaside aquifer, 11,000 from Carmel Valley aquifer and 9,000 from Los Padres and San Clemente Reservoirs), based on a PUC finding that this is the total water supply available to CAL-AM. However, there is considerable controversy over what should be considered the safe yield of the Carmel Valley aquifer, making total water supply availability open to question (California Public Utilities Commission, 1976). Estimates of how many years this project will extend water service to the area are therefore also open to question.

Ft. Ord, Marina and the remaining rural areas that are within the study area but outside the Salinas Valley or CAL-AM's service area also draw their water from groundwater stores. To date there has been no serious depletion of supplies in these areas, even though some of Ft. Ord's wells have been influenced by moderate salt water intrusion in the past. Ft. Ord is currently investigating the possibility of relocating their well field east of Fritzsche Air Field.

There have been several projects proposed to relieve the water shortages found on the Monterey Peninsula and the lower Salinas Valley. The CAL-AM groundwater withdrawal plans have already been mentioned. In addition, a large dam constructed by either CAL-AM or the U. S. Army Corps of Engineers on the Carmel River has been suggested as a new source of water. This is an extremely expensive long range plan and is not expected to be a factor in the next 5 to 10 years. A dam on the Arroyo Seco has also been suggested as a means to increase groundwater recharge of the Salinas Valley aquifers and supply water to high pumpage areas. This project is currently inactive. Two other surface diversion projects aimed at supplying water to high groundwater pumpage areas are also currently inactive. The Castroville Irrigation Project, designed to deliver water from the Salinas River near Salinas to the Castroville area for agricultural use, has been halted pending study of a possible 900-foot aquifer source in the valley's groundwater basin. The East Side Canal Project, designed to divert Salinas River water near Soledad and transport it to the East Side aquifer for groundwater recharge, has not advanced beyond the initial planning stage.

Other options being considered to augment local water supplies include tapping of possible deeper groundwater aquifers (the 900-foot aquifer mentioned above) and reclamation and reuse of domestic wastewater. State and federal water developments tapping the Sacramento-San Joaquin Valley basins have not yet included delivery to the Monterey-Salinas area in their plans.

Several water conservation measures have been enacted recently in the Monterey Peninsula area due to the severity of the 1975-1976 water year drought. The CAL-AM has imposed a water rationing program within its service area at the urging of the California Public Utilities Commission. The three-phase rationing plan places various degrees of control on the outside use of water, including landscape and golf course irrigation and washing of sidewalks, motor vehicles, trailers, boats, etc. The degree of restriction varies with the volume of water stored in CAL-AM reservoirs. The City of Monterey also adopted a modification to the city building code that requires installation of low-water-use toilets and shower heads and recirculating water systems in decorative fountains as a condition to receiving building permits for new structures. The City of Pacific Grove also adopted an ordinance placing restrictions on new water service connections and requiring low-water-use facilities in newly-constructed or substantially reconstructed dwellings or businesses.

The problems of water supply are also covered extensively in the Introduction to this report and in the Water Resources Section.

Liquid Waste Disposal. There are eight major wastewater treatment plants and several minor ones in the study area. They are maintained by the Castroville County Sanitation District, Marina County Water District, Seaside County Sanitation District, City of Salinas (3 facilities, including one for industrial waste), City of Monterey, City of Pacific Grove, and Ft. Ord, with one main facility and two small ones.

Process flow diagrams and design criteria for these plants are shown in the Facilities Plan (Engineering Science, Inc., 1976d).

Plant capacities and characteristics are discussed in the Introduction of this EIS. Table 20 shows wastewater flows and per capita generation, and Figure 2 shows wastewater discharge locations of the above facilities. The quality of the individual discharges is presented in Table K-2. Table 21 shows service area populations and connections.

Each of the major treatment plants is experiencing or will soon be experiencing problems meeting state and federal wastewater discharge requirements. A brief description of these shortcomings, taken from the Draft Facilities Plan, is presented below:

> Pacific Grove - the primary level treatment being used fails to meet RWQCB suspended solids discharge requirements; it also fails to meet the Federal Water Pollution Control Act, 1977, treatment requirements (this plant is being abandoned).

Table 20

1975 WASTEWATER FLOWS AND PER CAPITA GENERATION

Agency	1975 Average Annual Flow-mgd	Per Capita Flow Generation-gpcd
Castroville County Sanitation District	0.34	86
Marina County Water District	0.80	74.6
Seaside County Sanitation District	1.55	65.2
City of Salinas	8.2*	140**
City of Monterey	3.20	112
City of Pacific Grove	1.40	78.5
Ft. Ord (main garrison plant)	2.3	68.3

Table 21

CURRENT SERVICE AREA, POPULATION AND SERVICE CONNECTIONS CHARACTERISTICS 1974-75 [1]

Entity	Service Area (Acres)	Population	Sewer Connec-tions	Equiv. Dwelling Units	Avg. Dry Weather Flow (mgd)
Monterey	5,102	28,150	6,411	11,066	3.20
Pacific Grove[2]	3,988	18,000	6,765	7,400	1.40
Salinas	9,088	69,500	21,500	23,670	8.20*
Castroville C.S.D.	463	3,800	800	1,118	0.34
Seaside C.S.D.	2,120	24,800	6,464	6,900	1.55
Marina C.W.D.	1,600	11,500	2,429	3,215	0.80
Total	22,361	155,750	44,369	53,369	15.49

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1 - Source: City and district records.

2 - Also includes Del Monte Park C.S.D.

Source: Engineering Science, Inc., 1975.

* Includes 4.8 from Salinas Main, 0.7 from Salinas Alisal and 2.8 from Salinas industrial.

** Influenced by industrial discharges.

Monterey - the secondary treatment effluent fails to meet the 1977 federal BOD and suspended solids requirements; the discharge location is also within a discharge prohibition zone established by the RWQCB.

Seaside County Sanitation District - the primary treatment system fails to provide effluent quality sufficient to meet 1977 federal requirements; the discharge is also within a Monterey Bay discharge prohibition zone.

Ft. Ord - the Ft. Ord main garrison plant currently discharges treated effluent to Indian Head Beach, creating a potential health hazard to adjacent beaches. A proposed spray irrigation system is opposed by the State Department of Health due to the potential groundwater contamination hazard. The discharge is within the bay RWQCB discharge prohibition zone.

Marina County Water District - the Marina treatment system provides a wastewater quality sufficient to meet existing and proposed discharge requirements, but the discharge is within the RWQCB prohibition zone.

Salinas Plant No. 1 (Main Plant) - the secondary plant's effluent quality meets current discharge standards, but expected flow increases will result in unacceptably high suspended solids levels. The existing effluent does not meet river discharge quality guidelines recommended in the area's Basin Plan (California State Water Resources Control Board, 1975a).

Salinas Plant No. 2 (Alisal Plant) - effluent quality from this secondary facility meets present requirements, but the discharge to the river does not meet quality guidelines recommended in the area's Basin Plan.

Castroville County Sanitation District - this recently modified secondary plant is expected to produce effluent of sufficient quality to meet current standards. In the past it has had trouble meeting the suspended solids requirement. The discharge to Tembladero Slough is not in compliance with water quality recommendations in the Basin Plan (Engineering Science, Inc., 1976d).

There are numerous private waste treatment facilities and individual septic tanks in rural areas (Tables J-7 and J-8). There are also two major industrial liquid waste discharges to Monterey Bay. These are the Kaiser and Pacific Gas and Electric outfalls at Moss Landing. The character of these discharges is discussed in the Monterey Bay Environment section.

The Salinas industrial wastewater treatment and disposal ponds on the bank of the Salinas River (Figure 14) have no direct discharge to surface waters. Industrial wastewater (average flow of 2.8 mgd in 1974) is piped to a series of aerated lagoons and then sprinkler irrigated and percolated to the groundwater. It is not known whether the percolated water resurfaces in the Salinas River downstream, but its high salt content is undoubtedly contributing in some degree to the poor quality of the surface aquifer in the area. The saline condition of this uppermost aquifer has all but eliminated its use for domestic or agricultural water supply. For economic reasons, the industrial wastewater system has not been included as part of the north Monterey County regional wastewater treatment proposal. Handling of the industrial flows in the existing manner is not expected to prevent attainment of water quality objectives.

Solid Waste Disposal. There are four solid waste disposal sites in or near the study area: Crazy Horse Canyon, Chualar, Marina, and Ft. Ord, which is not open to the public.

The sites meet most of the present needs of the study area, though hazardous wastes must be sent out of the area.

Monterey County's *Solid Waste Management Plan* (Munson, 1976) calls for closure of the Chualar site by January 1977 because it is in the Salinas River floodplain. Its waste flow would probably be diverted to the Marina and Crazy Horse Canyon sites. By 1990 the Crazy Horse Canyon and Ft. Ord sites will also be closed, consolidating waste flows into the Marina site. There will be an increased salvage effort at the Marina site. By 2000 an active methane gas recovery and mechanical glass and metal recovery system is expected to be in use at Marina (Munson, 1976).

If the Marina site maintains its existing size and service area, its expected life is estimated to be 70 years. If it becomes the only north Monterey County site as described above, it will probably increase its size and have an estimated life expectancy of 50 to 70 years (Munson, 1976).

TABLE 22

MUNICIPAL SOLID WASTE PROJECTIONS
(Tons/Year)

Service Area	1975	1980	1990	2000
Monterey Peninsula, Carmel Valley, Coast, Marina	120,000	135,000	157,000	172,000
North County	19,000	25,000	34,000	42,000
Salinas	90,000	108,000	130,000	145,000
Gabilan	219	246	274	300
Toro	2,810	5,670	11,500	22,970
TOTALS	232,029	273,916	332,774	382,270

Source: Munson, 1976.

Power. Pacific Gas and Electric Company supplies both electrical and natural gas power to the entire study area. The electricity comes through their Northern California grid system and cannot be traced to any one generation site, but the Moss Landing natural gas and fuel oil-fired plant is part of that grid. Natural gas is piped in from a main north-south header that passes through the Santa Clara Valley.

Transportation. State Routes 1 and 68 and U.S. Route 101 serve interregional as well as intercity traffic. County roads and State highways 156, 183 and 218 are minor arterials or collectors (see Figure 1). In the county there are 2,103 miles of roads and streets: 301 are state highways, 1,330 county roads, and the rest city streets. Parts of State Routes 1 and 68 are officially designated state scenic routes and others are planned. (see Amenities.)

Most trips are made by automobile. Less than one percent of all travel is on public transportation. Table J-10 lists miles of road and vehicle miles traveled for the major cities in the county. In 1974, 85 percent of all county households were estimated to have one car; 30 percent had two or more (Monterey County Transportation Study, 1973).

Monterey Peninsula Transit offers intra-regional service on the peninsula and between the peninsula and Salinas. Greyhound provides service on U. S. 101 and between Salinas and Pacific Grove.

There is limited rail passenger service (two AMTRAK stops daily in Salinas, on the Oakland/Los Angeles route) and heavy freight service. Of the nine freight points, Spreckels and Salinas handled 1.0 million tons and 0.9 million respectively in 1970 (Monterey County Transportation Study, 1973).

The only commercial air service in the county is at the Monterey Peninsula Airport in Monterey. In 1970 it averaged 400 landings daily. An airport at Salinas serves general aviation. The Fort Ord airport is base-oriented, with few flights to other points.

Schools, Police and Fire Protection. Government agencies providing local services include general purpose governments, which provide for the administration of government and services such as public safety, libraries, neighborhood and community parks, and so forth. Cities in the study area having their own police and fire departments are Pacific Grove, Monterey, Seaside and Salinas. The City of Marina expects to have its own police department by 1977; it already has a fire department. Sand City has a police department and contracts with Seaside for fire protection. Del Rey Oaks has a police department and contracts with Monterey for fire protection. All unincorporated areas receive police protection from the Monterey County Sheriff. Castroville has its own fire department, which also has a station serving Moss Landing. There are separate fire protection systems in operation at the Monterey Airport and at Ft. Ord.

Special purpose districts may be formed for a variety of public purposes: flood control, regional parks, public transportation, mosquito abatement, and so forth. Typically, the most important kind of special purpose district is the school district, which often accounts for the largest share of the local property tax dollar. There are eight school districts providing elementary and secondary education in the study area and two districts providing college-level education (Monterey Peninsula, with facilities in Monterey, and Hartnell Community, with facilities in Salinas).

The school districts' recent enrollment experience has varied by area. The largest district in terms of total enrollment (15,717 pupils in 1975-1976) is the Monterey Peninsula Unified School District, which serves kindergarten through high school. Enrollment has been in rapid decline in this district and two schools have been closed in the past two years. The decline in enrollment has been attributed to cut-backs at Ft. Ord and the high cost of living in Monterey (Clark, pers. comm.). Continued decline in enrollment is anticipated for the foreseeable future and more school shutdowns are expected. The smaller unified district in Pacific Grove (3,108 pupils) has also been experiencing a declining enrollment in recent years, though no closures are planned.

In Salinas, the Salinas City School District (6,200 pupils) also reports declining total enrollment in its 14 elementary schools. Above the elementary level, the Salinas Union High School District (8,675 pupils) reports stable junior high school enrollments and slowly increasing high school enrollments. Some schools in this district are presently overcrowded, but the pressure will be lessened by the 1978 opening of the new high school just east of Castroville, which will remove about 1,600 pupils from Salinas schools.

Districts reporting increasing enrollments are the North Monterey County Unified School District (3,178 pupils) serving Moss Landing, Prunedale and Castroville; and the Spreckels Union School District, serving the Spreckels area (609 pupils). The former district reports growing enrollments, particularly attributable to new development in the Prunedale area. The district will open a new high school in 1978, as mentioned above. The Spreckels District anticipates slowly rising growth due to subdivision activity, and will consider building a new school to increase district capacity by 300 to 500 as new development is approved. The Santa Rita Union School District (1,100) also reports increasing enrollments, which it attributes to new residential construction in the Northridge area. Finally, the Alisal District (2,302 pupils) sees slowly rising enrollments due to new construction and the Washington Union District (791) reports stable enrollment.

History

Indian Period. At the time of Spanish intrusion, the Rumsen dialectic branch of the Costanoan people, part of the Penutian language family, occupied the study area and beyond, from San Francisco Bay to near Point Sur and probably inland to the coast mountains. Major villages were usually on bays near fresh water, with smaller camps and villages for seasonal gathering both on the coast and inland. Displacement of the Indians began with the establishment of Spanish Missions.

Spanish Colonization. Cabrillo entered Monterey Bay in 1542, but heavy surf prevented his landing. The Monterey Bay area was mapped and surveyed in 1602 by Vizcaino, who was seeking a suitable harbor for the Spanish fleet. For the next 150 years, wars and internal problems prevented settlement, but the threatened encroachment of Russian fur traders spurred Charles III to send Gaspar de Portola to establish missions and presidios in Alta California.

In 1770, therefore, Portola and Father Junipero Serra claimed the area for the Spanish crown. Land expeditions from Mexico (the first led by de Anza) brought colonists. Monterey became the capital of California, and the religious capital as well, since it was in the middle of the chain of missions by then stretching from San Diego to north of San Francisco.

After the Mexican war of independence, California was governed by Mexico and Monterey lost its status as a capital.

American Annexation. In 1846 the United States, victorious in the Mexican-American war, acquired California and Monterey. In 1849 a constitutional convention was held in Monterey, the main issue being whether California was to be a state or a territory. The delegates voted to join the union as a free (as opposed to a slave) state.

The gold rush transferred Monterey's business and prestige to the port of San Francisco, more convenient to the gold fields, and the state capital became San Jose.

In the 1850's and 1860's, whaling was the major industry on the coast. In the 1900's sardine fishing replaced whaling; by 1920, Monterey had the third largest fish tonnage in the world. But by 1940 the catch had decreased drastically, forcing many companies out of business.

The City of Salinas was founded in 1856 as a resting place halfway between the Carmel and San Juan Bautista missions. By 1874, when the city was incorporated, it had become a commercial and agricultural center for a 3-county area. Today it remains an active agricultural community and is the seat of the Monterey County government.

Historic sites. Search of the National Register of Historic Places (Federal Register, February 10, 1976, Vol. 41 No. 28 and Amendments to date) and a listing of California historical landmarks (California Department of Parks and Recreation, 1971) determined that no recognized historic sites are found on or adjacent to facilities planned as part of this project. A list of state and federal sites found within the study area is presented below.

El Castillo - Monterey
Larkin House - Monterey
Monterey Old Town Historic District - Monterey
Royal Presidio Chapel - Monterey
Stevenson House - Monterey
U. S. Customhouse - Monterey
Boronda, Jose-Eusebio Adobe - Salinas
Colton Hall - Monterey
Vizcaino-Serra Landing - Monterey
First Theater - Monterey
Governor Alvarado House - Monterey
Vasquez House - Monterey
Stevenson House - Monterey
House of Four Winds - Monterey
Pacific House - Monterey
Casa de Oro - Monterey
Hill Town Ferry - between Monterey and Salinas
Chautauqua Hall - Pacific Grove
Gutierriz Adobe - Monterey
Soberanes Adobe - Monterey
Battle of Natividad - Natividad

The National Register of Historic Places is published in its entirety in the Federal Register during the month of February each year. Addenda are also published in the Federal Register the first Tuesday of each month to add newly-recognized sites.

Amenities

Visual. The scenery of the study area is famous. Some of the most beautiful coastline in California is seen on the peninsula's 17-mile drive. State Highway 68 from Monterey to Salinas, and State Highway 1 from its junction with 68 southward are officially designated state scenic routes. State Highway 1 north of the 68 junction and State Highway 156 from Castroville to Prunedale are on the Scenic Highways Master Plan, but not yet designated. Laureles Grade from Highway 68 to Carmel Valley Road is a county scenic route. A wide variety of visual experiences account for this abundance of designations -- the open, flat Salinas Valley flanked by steeply rising mountains; rolling, oak-covered hills; open woodland and grassland; sparsely vegetated sand dunes; interesting croplands; urban development more attractive than most; the historic and picturesque city of Monterey.

Recreation. The area's physical beauty is enhanced by its world famous golf courses - 15 in the county; most are inside or next to the study area.

The many parks are listed under Land Use. These are popular for swimming and other water sports, such as skin-diving. (Some divers fish for abalone.) Deep-sea fishing is available, as is waterfowl hunting. Pleasure boating is popular (see Land Use).

The City of Monterey has two particular attractions -- its well-maintained historical buildings, and the harbor. At the harbor, a breakwater visited by sea lions and birds offers a pleasant backdrop to the busy complex of restaurants and gift shops, many selling the books of John Steinbeck, whose novels made the area familiar around the world.

The major spectator events in the area include annual auto races at Laguna Seca (30,000-50,000 attendees), the Bing Crosby Golf Tournament in Pebble Beach, and the Monterey Jazz Festival (5,000-6,000 attendees). The wide range of attractions has made the study area a second home or retirement home choice of many, and such a tourist mecca that tourism is a major industry.

Site Specific Environment

This section of the environmental setting describes in greater detail those sites that may be physically modified by the proposed project. The description is limited to the site conditions that will be significantly affected by the proposed action or will significantly influence the magnitude of project impacts. Where proposed project facilities have not yet been located on a specific site, the general area likely to be impacted is described.

Potential Regional Treatment Plant Sites

Six alternative sites were originally considered for the regional treatment facility near the mouth of the Salinas River (Figure 28). Later, two additional sites on Ft. Ord were considered, but they are not given detailed coverage here for reasons stated in the Alternatives section. The reason for selection of all the sites is also described in the Alternatives section. The parcels are of varying sizes and all are considerably larger than the land needed for the plant. The most probable facility location within several of the sites is indicated in Figure 30.

Alternative Site 1. Regional treatment plant Site 1 is a 250+ acre parcel of low undulating, stabilized sand dunes (2-15 percent slopes) with both internal and external drainage. The site is privately owned.

The current land use of the site is grazing, and the vegetative cover is grassland. The new State Highway 1 route borders the property on the west and a sand mining operation is immediately northwest. The land to the north and east is also open grassland which is occasionally grazed. Urban development borders on the south.

The 1967 Marina Master Plan (Monterey County Planning Commission, 1967) designates Site 1 as industrial reserve in the future. Land immediately south is planned as single family residential and land to the east, across State Highway 1, is designated for urban expansion. The extreme southern portion of Site 1 is within the city limits of the recently incorporated city of Marina. The planning for that area may therefore be subject to change. Current zoning in the vicinity of all of the treatment plant sites is shown in Figure J-1.

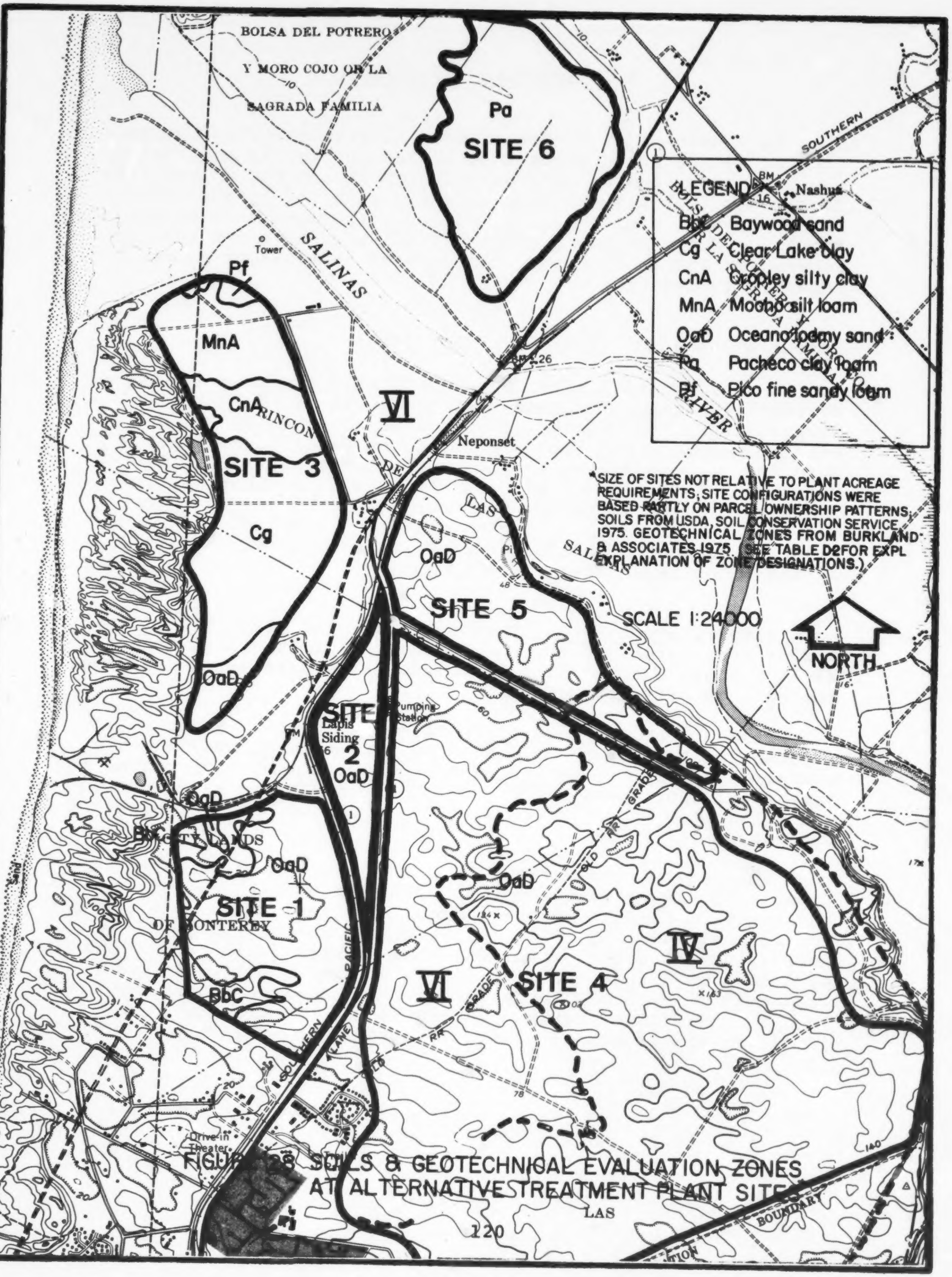

BOLSA DEL POTRERO
Y MORO COJO OR LA
SAGRADA FAMILIA
Pa
SITE 6
Pf
MnA
CnA
RINCON
SITE 3
Cg
OaD
VI
Neponset
SALINAS
RIVER
SOUTHERN
Nashua
LEGEND
BbC Baywood sand
Cg Clear Lake clay
CnA Cropley silty clay
MnA Mocho silt loam
OaD Oceano loamy sand
Pa Pacheco clay loam
Pf Pico fine sandy loam
*SIZE OF SITES NOT RELATIVE TO PLANT ACREAGE REQUIREMENTS; SITE CONFIGURATIONS WERE BASED PARTLY ON PARCEL OWNERSHIP PATTERNS. SOILS FROM USDA, SOIL CONSERVATION SERVICE 1975. GEOTECHNICAL ZONES FROM BURKLAND & ASSOCIATES 1975. (SEE TABLE D2 FOR EXPLANATION OF ZONE DESIGNATIONS.)
SCALE 1:24000
NORTH
SITE 5
SITE 2
Lapis Siding
Pumping Station
BbC
CITY LANDS
SITE 1
DE MONTEREY
BbC
IV
VI
SITE 4
SOUTHERN PACIFIC
Drive-in Theater
LAS
BOUNDARY
Tower

FIGURE 28 SOILS & GEOTECHNICAL EVALUATION ZONES AT ALTERNATIVE TREATMENT PLANT SITES

The California Coastal Plan, recently published by the California Coastal Zone Conservation Commission (1975), has designated Site 1 as grazing land. The area is also within a large special study zone, however. This indicates that the Coastal Commission recommends additional study to determine the ultimate use of the land. The coastal sand dunes to the west of Site 1 are listed as special land habitat in the plan, and are recommended for acquisition. The southwestern tip of Site 1 is within the Coastal Commission's permit zone.

Most of the site is overlooked by both the existing and the new State Highway 1 routes. The northern end of the property is blocked from view to those traveling south on the present Route 1. A field survey located no surface evidence of archeological resources.

Recent (stabilized) sand dune deposits underly the entire site. Oceano loamy sand and Baywood sand soils have formed on the surface. Figure 28 shows the distribution and Table 23 the properties and limitations of the soils in the vicinity of all of the treatment plant sites, as recorded in the Soil Survey of Monterey County, California, An Interim, Unedited Report (U. S. Department of Agriculture, Soil Conservation Service, 1975).

Faults in the vicinity of the alternative treatment plant sites are described in the Seismic Features section of the Environmental Setting.

Alternative Site 2. Treatment plant Site 2 is a 80+ acre plot of old sand dunes; it is relatively level and elevated slightly above adjacent Highway 1. Drainage is to the west and southwest. The entire site is privately owned.

The open land shows no sign of current human use. It does not appear to have been recently grazed, but its grasses may be occasionally mowed.

Alternative Site 1, described above, lies to the southwest of Site 2, while Site 4 is immediately across Highway 1 to the east. Rolling grassland also borders the property to the west and northeast. Row crops are being grown on the flat agricultural land to the northwest. There are no residences or structures of any kind on or immediately adjacent to Site 2.

The Marina Master Plan designates Site 2 as industrial reserve. Land to the west is similarly designated, while the land to the east across State Highway 1 is planned for urban expansion. The California Coastal Plan (California Coastal Zone Conservation Commission, 1975) designates Site 2 as grazing land, but also includes it within a special study area (see Site 1 above for explanation).

Table 23

SOILS MAPPED WITHIN PROPOSED TREATMENT PLANT SITES

Mapping Symbol	Soil Phase*	Depth In.	Rating for Use as Sewage Lagoon Area	Engineering Classification		Shrink-Swell Potential	Erosion Factors		Flooding	High Water Table Depth-Ft.	Rating as Construction Site for Small Commercial Building	Factors Adversely Affecting Water Management Features:	
				Unified	AASHO		K	T				Pond, Reservoir Area	Embankments, Levees
BbC	Baywood sand, 2-15% slopes	0-60	Severe: slope, seepage	SP-SM, SM	A-3, A-2	Low	0.15	5	None	>6.0	Severe: slope	Slope, seepage	Piping
Cg	Clear Lake clay, moderately wet	0-33 33-54 54-62	Severe: floods	CL,CH CL SM	A-7 A-6 A-4	High Moderate Low	0.24 0.24 0.24	5	Common-brief	3.0-5.0 Jan-Dec	Severe: floods, shrink-swell, low strength	Favorable	Low strength, piping, hard to pack
CnA	Cropley silty clay, 0-2% slopes	0-69	Slight	CL,CH	A-7	High	0.24	5	None	>6.0	Severe: shrink-swell, low strength	Favorable	Low strength, compressible, hard to pack
MnA	Mocho silt loam, 0-2% slopes	0-68	Moderate: seepage	CL-ML, CL	A-4 A-6	Moderate	0.43	5	None	>6.0	Moderate: shrink-swell	Seepage	Piping, hard to pack
OaD	Oceano loamy sand, 2-15% slopes	0-80	Severe: slope, seepage	SP-SM, SM	A-2 A-3	Low	0.10	5	None	>6.0	Severe: slope	Slope, seepage	Seepage, piping, hard to pack
Pa	Pacheco clay loam	0-65	Severe: wetness	CL	A-6, A-7	Moderate	0.43	5	None to rare	3.0-5.0 Dec-May	Moderate: shrink-swell, low strength	Favorable	Low strength
Pf	Pico fine sandy loam	0-55 55-72	Severe: seepage	SM SM	A-4 A-1, A-2	Low Low	0.20 0.10	5	None	>6.0	Slight	Seepage	Piping

* Soil terminology defined in the Glossary.

Source: U. S. Department of Agriculture, Soil Conservation Service, 1975.

Site 2 can be clearly viewed from the new route of State Highway 1 but is partially hidden to persons traveling the present highway by a low hill. An archeological field survey uncovered no archeological resources.

Geologically, the entire site is underlain by Recent sand dunes (stabilized); the soil is Oceano loamy sand (Figure 28). See the Alternative Site 1 section for a discussion of seismic hazards in the vicinity of Site 2 and the remaining sites.

Alternative Site 3. Treatment plant Site 3 includes 320 acres of level alluvial land immediately south of the Salinas River. The plot is less than 10 feet above sea level and drains northward into the river.

The major portion of the area is privately owned and currently being cultivated for production of row crops. The extreme north end, however, lies within a federally-owned wildlife area managed by the California Department of Fish and Game and is open to public use. Coastal sand dunes and the Pacific Ocean lie immediately west of the property while open grassland and additional agricultural acreage are to the south. Both the present and the new State Highway 1 routes run along the eastern border of the site. The state-managed wildlife area and the Salinas River adjoin the property to the north while several agricultural service roads and farm houses and more agricultural land lie to the northeast.

The major portion of the site is depicted as agricultural on the Marina Master Plan, but the extreme northern tip lies within a recreation area and the southern tip is within industrial reserve. Land immediately to the west is shown as multiple residential and the new State Highway 1 route is shown to the east on the Marina Master Plan. The new City of Marina abuts the southwestern edge of Site 3; planning for future use of that area may therefore change.

The California Coastal Plan (California Coastal Zone Conservation Commission, 1975) includes the site within a cultivated agriculture designation and the same special study zone referred to in the Site 1 and 2 descriptions. The dunes to the west are within a special land habitat and have been proposed for acquisition by the Coastal Commission. The western fringe of Site 3 is within the Commission's permit zone.

Site 3 is clearly visible from both the present and future routes of State Highway 1. There were no archeological resources found in a field survey of the area.

Recent Salinas River alluvial deposits underly most of Site 3, with only the extreme southern end extending into the stabilized sand dunes. Soils of the area include Clear Lake clay (moderately wet), Cropley silty clay, Mocho silt loam, Pico fine sandy loam and Oceano loamy sand (Figure 28).

Alternative Site 4. Site 4 is a 760-acre parcel of rolling dune land with elevations ranging from less than 60 to over 160 feet. Drainage is predominantly to the west. Treatment plant Sites 1 and 2 border the property on the west and Site 5 borders to the north. All of these sites are quite similar in appearance.

The current use of Site 4 is non-irrigated grazing and solid waste landfilling. Land to the west, across State Highway 1, and to the north, across the landfill access road, is also grazed. The Marina sanitary landfill is located in the northeastern portion of the site and the Salinas River floodplain runs along the entire eastern edge. The southern border is formed by the Ft. Ord Military Reservation boundary while the southeastern edge of Site 4 abuts the City of Marina's urban fringe. Ownership of Site 4 is divided between private individuals and the Monterey Peninsula Garbage and Refuse Disposal District.

The county's Marina Master Plan designates most of Site 4 for future urban expansion. The southwestern corner of the site is now within the City of Marina, however, and planning for the area may be altered as a result. The California Coastal Plan (California Coastal Zone Conservation Commission, 1975) lists Site 4 as grazing land.

Very little of Site 4 is visible from roads in the area. Rolling hills along the western border block views from Highway 1. There were no archeological resources found in a field survey of the area.

Recent sand dunes (stabilized) underly all of Site 4. Oceano loamy sand soils have formed on the surface.

Alternative Site 5. Treatment plant Site 5, immediately north of Site 4, is underlain by the same old sand dune formation as Sites 1, 2 and 4. Elevations range from slightly less than 40 to over 120 feet and drainage is to the north. The majority of the site is privately owned, with a small parcel on the eastern end owned by the Monterey Peninsula Garbage and Refuse Disposal District.

The site is currently supporting a variety of uses, including grazing, pasture and rural residential. Adjacent uses include: the Salinas River floodplain to the north and east; State Highway 1 and the Southern Pacific Railroad tracks on the western border; and Alternative plant Site 4 (grassland and landfill) to the south.

Future use of the southern portion of the site is listed as urban expansion on the Marina Master Plan; no designation is given to the northern section. Land south of the site is similarly designated as urban expansion and the new State Highway 1 route will pass along the western border. The California Coastal Plan (California Coastal Zone Conservation Commission, 1975) maps the area as grazing land.

Motorists on State Highway 1 can view only the western and northern fringes of Site 5, as rolling hills block the view of the interior. No archeological resources were found in a field survey of the area.

Site 5 is also within the area of Recent (stabilized) sand dune deposits just south of the Salinas River near the coast. The soils typical of the dune area - Oceano loamy sand - are mapped over the entire site.

Alternative Site 6. Treatment plant Site 6 is just north of the Salinas River, approximately 1-1/2 miles south of Castroville. The land is nearly flat and only 10 feet above sea level. Drainage is south into the Salinas River. The site is privately owned.

The site is currently used for growing artichokes and there are two farm houses and associated structures on the site's southern edge. Adjacent properties are also being used to grow artichokes. State Highway 1 passes along the southeastern edge of the property.

County planning for this site is included within the Moss Landing Area Development Plan (Koebig & Koebig, Inc. and Hahn & Wise, 1973) rather than the Marina Master Plan. The plan designates Site 6 and the surrounding area for continued agricultural use. The State Coastal Plan (California Coastal Zone Conservation Commission, 1975) also designates it as agricultural land.

The flat, open nature of Site 6 makes it readily visible to motorists on State Highway 1. The new state route is immediately adjacent to the property. An archeological field survey of Site 6 did not locate surface evidence of archeological resources.

Site 6 is formed of Recent alluvial deposits on the Salinas River floodplain. The only soil type mapped on the area is Pacheco clay loam.

Seismic Conditions Near the Treatment Plant Sites. Burkland and Associates (1975), in their seismic report to Monterey County, identify two categories of seismic hazard in the vicinity of the alternative treatment plant sites. Hazard Zone VI is mapped over all of the sites except the eastern portion of Site 4 (see Figure 28). The Zone VI designation indicates a general condition conducive to lurch cracking, lateral spreading, vibration damage and ground rupture during seismic events. Zone IV indicates less chance for these occurrences, but a relatively greater chance for local subsidence and uplift (see Table D-2). A recent reconnaissance geotechnical study of the sites conducted by John V. Lowney & Associates (1976) indicates a definite liquefaction potential on Sites 3 and 6, but adequate foundation conditions on the other sites. The Lowney report also indicates that the area around the alternative treatment plant sites is likely to experience at least one moderate to major earthquake causing moderate to severe ground shaking during the design life of the project.

Wildlife Use of the Treatment Plant Sites. The grassland vegetation on Sites 1, 2, 4 and 5 supports a limited variety of animal life. The most evident permanent inhabitants are small mammals, including mice, ground squirrels and jack rabbits; and typical grassland-associated birds, i.e., western meadowlark, mourning dove, American kestrel. During fall and spring, migrant birds increase the grassland populations to their highest annual totals. Most of the migrants are small passerine species (sparrows, finches, etc.), but predatory birds (red-tailed hawk, rough-legged hawk) also use the grasslands as feeding grounds. Many seasonal and year-round residents of the riparian habitat along the Salinas River feed in the grasslands of Sites 4 and 5, while using the heavier vegetation along the river for cover and nesting. This includes owls, marsh hawks and white-tailed kites. Sites 1 and 2 are farther from the riparian areas and therefore receive less of this occasional use.

The cultivated lands of Sites 3 and 6 support even less a variety of wildlife. Small mammals, principally mice, and rats, reside in the fields permanently, while prey species (kestrels, marsh hawks, kites, feral cats, owls) that inhabit bordering land use the croplands for feeding grounds. The type and density of animal life on cultivated fields varies significantly with the type of crop, frequency of tilling and presence or absence of weed and pest control measures.

Salinas River Disposal Site

A specific site for the Alternative 134 river discharge has not yet been identified. Its location depends mainly on the treatment plant site chosen. If Sites 1, 2, 3 or 6 are used, the discharge would likely be downstream of the Highway 1 bridge in the lagoon. If Sites 4 or 5 are chosen, the discharge would probably be in the river upstream of the bridge, in the vicinity of the landfill site. Currently, it appears Site 4 is the likely choice for the treatment plant.

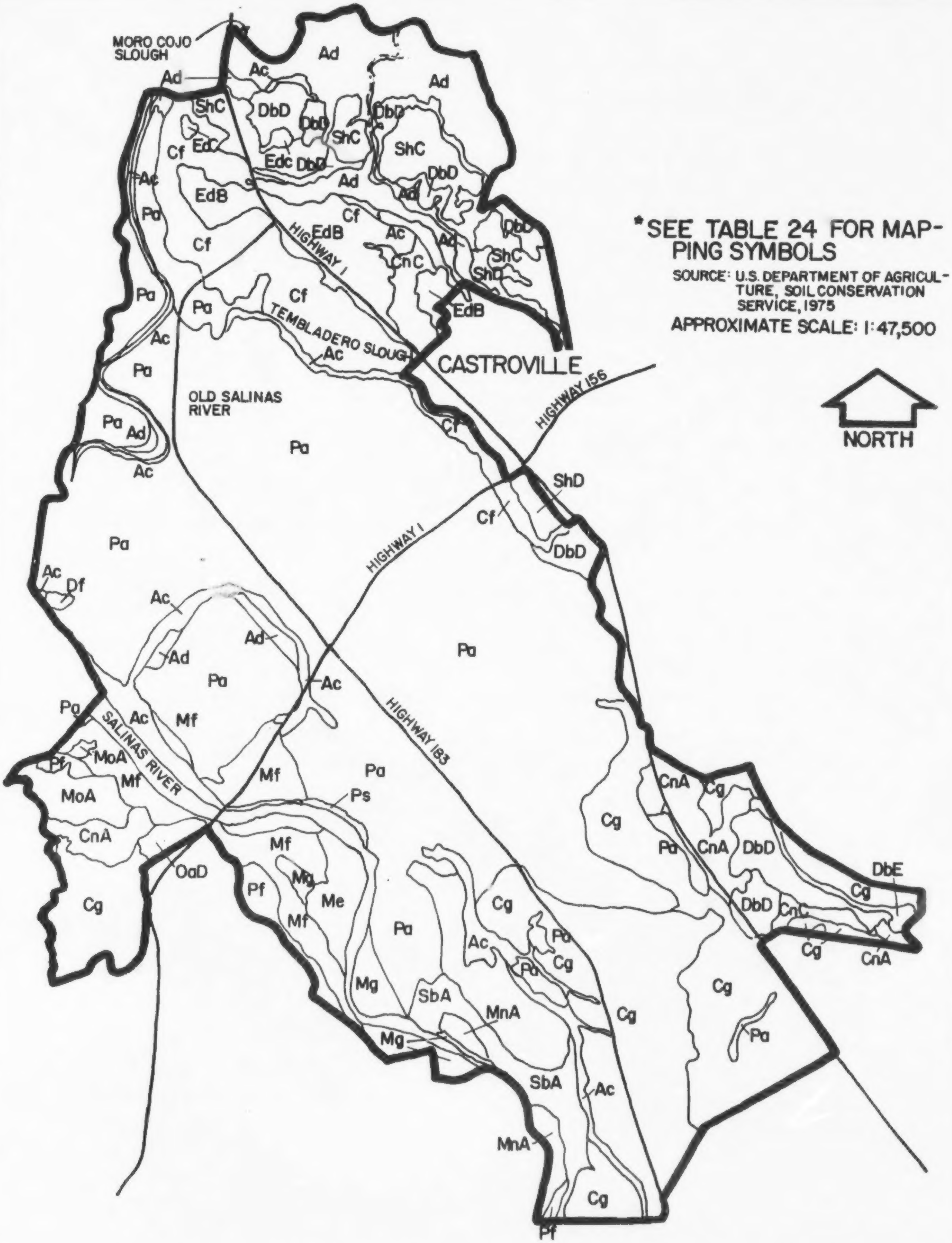
Human use of the lagoon is limited primarily to sport fishing, duck hunting and occasional boating. The land along the north bank is agricultural and that along the south is both agricultural and recreational. A State Department of Fish and Game-managed wildlife area encompasses a major portion of the lower lagoon itself and the non-agricultural land to the south. It is open to the general public for fishing and waterfowl hunting in season. State and local planning for the area suggests that these uses will continue in the foreseeable future.

The river in the vicinity of the Marina landfill site receives little human use. The landfill borders the river on the south and agricultural land lies to the north. Occasional warmwater fishing may occur, but there is no public access to this stretch of the river. The existing land uses should continue in the foreseeable future.

Information on vegetation, fish and wildlife and water conditions in the lagoon and river has been included in preceding Environmental Setting sections.

Irrigation Area - Castroville Irrigation District and Vicinity

In the wastewater reclamation and irrigation reuse alternatives, land near Castroville is likely to be used for irrigation reuse of wastewater. The project engineers have specified the Castroville Irrigation District (CID) as the most likely reuse area, but in actuality, surrounding land could also be used. The following description includes all land within the CID boundaries. The District is actually Zone 6 of the Monterey County Flood Control and Water Conservation District and includes 9,000 acres of agricultural land in the Moss Landing-Castroville area (see Figure 29).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TEMBLADERO SLOUGH
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OLD SALINAS RIVER
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HIGHWAY 183
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SbA
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MnA
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*SEE TABLE 24 FOR MAPPING SYMBOLS

SOURCE: U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, 1975

APPROXIMATE SCALE: 1:47,500

NORTH

FIGURE 29 SOILS OF THE CASTROVILLE IRRIGATION DISTRICT

The District occupies the lower Salinas River alluvial plain; loam and clay loam soils are dominant in this area. Clear Lake clays and Pacheco clay loams occupy the greatest areas, but smaller parcels of Alviso, Cropley, Diablo, Elkhorn, Metz, Mocho, Oceano, Salinas and Santa Ynez soil types are within the District. (Table 24 lists some of the general soil characteristics and Figure 29 maps their distribution.)

Runoff from the District is carried by the Salinas River, Old Salinas River, Tembladero, Moro Cojo and Alisal Sloughs and the Main Reclamation Ditch. Periodic high water levels in these drainages and in the subsurface combine with relatively slow percolation rates to make drainage a frequent problem in the District. High water table problems are especially prevalent in the winter months along the drainageways. In most places, however, the upper unconfined water table is more than 6 feet below the surface (U.S.D.A. Soil Conservation Service, 1975).

Artichokes and lettuce are by far the dominant crops grown in the District. Smaller acreages of celery, broccoli and cabbage are found in scattered locations. The only other land use of consequence in the District is grazing, which occurs on the lowlands near Moro Cojo Slough, just east of Moss Landing. The land surrounding the District is also primarily agricultural, with the exception of the Moss Landing and Castroville urban areas on the north. The coastline west of the District boundary is heavily used by recreationists.

Surface and Subsurface Storage Areas

The proposed storage reservoirs for Alternatives 170 and 171, although not specifically located, would probably be in close proximity to the regional wastewater treatment plant somewhere south of the Salinas River. This rolling duneland previously described as Alternative Treatment Plant Sites 4 and 5 offer the best natural features for percolation and subsurface storage (Metcalf & Eddy, 1975).

The soil in the area is Oceano loamy sand (Table 24). The high percolation rate (6-20 inches per hour) and depth to groundwater (estimated to be 50 feet in Metcalf & Eddy, 1975) in this area make it attractive as either a percolation-infiltration disposal or underground storage site. The permeability and slope are not conducive to surface storage, however. For a further description of the general area, refer to the site specific environments of treatment plant Sites 4 and 5.

Table 24

SOILS MAPPED WITHIN THE CASTROVILLE IRRIGATION DISTRICT

Mapping Symbol	Soil Phase*	Land Capability Unit	Depth Inches	Permeability Inches/Hour	Available Water Capacity In./In.	Soil Reaction	Salinity mmhos/cm	Erosion Factors		Flooding	High Water Table Depth-Ft.	Bedrock Depth-Inches	Factors Adversely Affecting Water Management Features:	
								K	T				Drainage	Irrigation
Ac	Alviso silty clay loam	VIIIw1	0-14 14-45	0.06-0.6 0.06-0.2	0.07-0.15 0.07-0.15	6.6-8.4 6.6-8.4	>2 >2	— —	- -	Common-brief	0.0-1.0 Jan-Dec	>60	Poor outlets, wetness, floods	Wetness, excess salt, percs slowly
Ad	Alviso silty clay loam drained	IVw6	0-14 14-45	0.06-0.6 0.06-0.2	0.07-0.15 0.07-0.15	6.6-8.4 6.6-8.4	>2 >2	— —	- -	Rare	1.0-2.0 Jan-Dec	>60	Wetness, poor outlets	Wetness, percs slowly, excess salt
Cf	Clear Lake clay	IIIw5	0-33 33-62	0.06-0.2 0.06-0.2	0.10-0.16 0.10-0.16	6.1-7.3 6.1-8.4	<6 <6	0.24 0.24	5	Common-brief	1.0-3.0 Oct-Mar	>60	Wetness, percs slowly	Wetness, slow intake
Cg	Clear Lake clay, moderately wet	IIw5	0-33 33-54	0.06-0.2 0.06-0.2	0.13-0.16 0.17-0.19	6.1-8.4 7.4-8.4	<4 <2	0.24 0.24	5	Common-brief	3.0-5.0 Jan-Dec	>60	Wetness, percs slowly, floods	Wetness, floods, slow intake
CnA	Cropley silty clay, 0-2% slopes	IIs5	0-69	0.06-0.2	0.13-0.17	6.6-8.4	<2	0.24	5	None	>6.0	>60	Percs slowly	Slow intake, percs slowly
CnC	Cropley silty clay, 2-9% slopes	IIe5	0-69	0.06-0.2	0.13-0.17	6.6-8.4	<2	0.24	5	None	>6.0	>60	Percs slowly, slope	Slow intake, percs slowly, slope
DbD	Diablo clay, 9-15% slopes	IIIe5	0-53	0.06-0.2	0.14-0.19	6.1-8.4	<2	0.24	3	None	>6.0	40-60	Complex slope, percs slowly	Complex slope, slow intake, percs slowly
DbE	Diablo clay, 15-30% slopes	IVe5	0-53	0.06-0.2	0.14-0.19	6.1-8.4	<2	0.24	3	None	>6.0	40-60	Complex slope, percs slowly	Complex slope, slow intake, percs slowly
Df	Dune land	VIIIe1	—	—	—	—	—	—		—	—	—	—	—
EhB	Elkhorn fine sandy loam, 2-5% slopes	IIe1	0-26 26-46	2.0-6.0 0.2-0.6	0.11-0.15 0.14-0.18	5.6-7.3 5.6-7.3	<2 <2	0.32 0.28	5	None	>6.0	>60	Slope, percs slowly	Slope
EhC	Elkhorn fine sandy loam, 5-9% slopes	IIe1	0-26 26-46	2.0-6.0 0.2-0.6	0.11-0.15 0.14-0.18	5.6-7.3 5.6-7.3	<2 <2	0.32 0.28	5	None	>6.0	>60	Slope, percs slowly	Slope
Me	Metz loamy sand	IIIs4	0-12 12-99	6.0-2.0 0.6-2.0	0.07-0.11 0.07-0.10	6.6-8.4 6.6-8.4	<2	0.17 0.15	5	None	>6.0	>60	Favorable	Fast intake, droughty
Mf	Metz fine sandy loam	IIs4	0-12 12-99	2.0-6.0 0.6-2.0	0.13-0.17 0.07-0.10	6.6-8.4 6.6-8.4	<2 <2	0.28 0.15	5	None	>6.0	>60	Favorable	Fast intake, droughty
Mg	Metz complex	IVe4	0-12 12-99	6.0-20.0 0.6-2.0	0.07-0.11 0.07-0.10	6.6-8.4 6.6-8.4	<2 <2	0.17 0.15	5	None	>6.0	>60	Slope	Slope, fast intake, droughty
MnA	Mocho silt loam, 0-2% slopes	I	0-68	0.6-2.0	0.16-0.20	7.4-8.4	<2	0.43	5	None	>6.0	>60	Favorable	Favorable
MoA	Mocho silty clay loam, 0-2% slopes	I	0-68	0.2-0.6	0.18 0.18-0.21	7.4-8.4	<2	0.37	5	None	>6.0	>60	Favorable	Favorable
OaD	Oceano loamy sand, 2-15% slopes	IVe4	0-90	6.0-20.0	0.05-0.08	5.6-7.3	<2	0.10	5	None	>6.0	>60	Slope, cutbanks cave	Complex slope, droughty, fast intake
Pa	Pacheco clay loam	IIw2	0-65	0.2-0.6	0.18-0.21	6.1-8.4	<15	0.43	5	None to rare	3.0-5.0 Dec-May	>60	Wetness, excess salt	Wetness, excess salt
Pf	Pico fine sandy loam	I	0-55 55-72	2.0-6.0 0.6-2.0	0.13-0.15 0.03-0.05	7.4-8.4 7.9-8.4	<2 <2	0.20 0.10	5	None	>6.0	>60	Favorable	Favorable
Ps	Psamments and fluvents, frequently flooded	VIIIw1	0-60	76.0-72.0	0.03-0.05	6.6-7.3	<2	—		Common-brief to very long	2.0-6.0 Oct-Jun	>60	Floods, wetness, poor outlets	Floods, wetness, droughty
SbA	Salinas clay loam, 0-2% slopes	I	0-5 5-75	0.2-0.6 0.2-0.6	0.18-0.21 0.16-0.20	6.6-7.3 6.6-8.4	<2 <2	0.37 0.43	5	None	>6.0	>60	Favorable	Favorable
ShC	Santa Ynez fine sandy loam, 2-9% slopes	IVe3	0-18 18-43	0.6-2.0 <0.06	0.09-0.16 0.01-0.03	5.6-7.3 5.6-7.8	<2 <2	0.43 0.37	1	None	>6.0	>60	Slope, percs slowly	Slope, percs slowly, rooting depth
ShD	Santa Ynez fine sandy loam, 9-15% slopes	IVe3	0-18 18-43	0.6-2.0 <0.06	0.09-0.16 0.01-0.03	5.6-7.3 5.6-7.8	<2 <2	0.43 0.37	1	None None	>6.0	>60	Slope, percs slowly	Slope, percs slowly, rooting depth

* Soil terminology defined in the Glossary.

Source: U. S. Department of Agriculture, Soil Conservation Service, 1975.

Ocean Outfall - South-Central Monterey Bay

Inasmuch as the currently favored outfall location for the marine disposal alternative would be somewhere along the coast of Monterey Bay south of the Salinas River and north of Fort Ord, some more detailed consideration of this area is desirable.

It appears that the general circulation of this part of Monterey Bay is, like the rest of the bay, governed primarily by oceanic events (the "offshore current structure"), and that for the most part there is good mixing and exchange with the open sea. In the southern end of the Bay, however, there is a tendency for a more or less persistent gyre behind Pt. Pinos, in the area of Monterey Harbor, with a tendency toward sluggish circulation indicated near shore along the entire region (Figure 25). Also, the longshore current, which influences circulation at or near the surf line and the movement of sands and larger materials, is prevailingly to the south in Monterey Bay.

The Central Coastal Basin Water Quality Control Plan Report (California State Water Resources Control Board, 1975a) recognized this area of poor circulation in the south bay and subsequently established a waste discharge prohibition area landward of a line drawn between Pt. Pinos and the mouth of the Salinas River (Figure 24). The Basin Plan also noted that agricultural waste discharges to the Salinas River and subsequently to the bay were probably creating a buildup of pesticides in the bottom sediments near the mouth of the river. This area and areas of high nutrients due to wastewater discharges and ocean upwelling are shown in Figure 25.

Since January of 1976, Engineering Science, Inc. has been monitoring subsurface ocean current speed and direction at two locations and at two depths in the anticipated outfall area. The results of the first six months of this monitoring indicate that predominant currents at the station just south of the mouth of the Salinas River are predominantly up-coast or down-coast. (Both directions are 75° sectors established with reference to a baseline perpendicular to the coast.) This is true at the 9-, 15- and 25- meter depths (current meters moved from 15- to 25-meter depth after April). At the station just north of the mouth of the river, a similar condition was recorded, with a slightly greater tendency for up-coast onshore currents at the 9-meter depth. Average current speeds ranged from a minimum of 6.0 cm/second to a maximum of 14.3 cm/second at the 9-meter depth, with a slightly similar range of 5.6 to 15.5 cm/second at the 15-meter depth (Engineering Science, Inc., 1976f). At the 25-meter depth, measured since

April, the current speeds have ranged from an average minimum of 3.7 cm/second to a maximum of 9.7 cm/second. Figure G-1 and Tables G-1 and G-2 display the full results of this 6-month current metering. It should be noted that the detailed data collected to date do not necessarily represent conditions throughout the year, as current patterns may change significantly with changes in the season.

The principal biotic communities in southern Monterey Bay are summarized in Table 25. Of these, the rocky shore community is quite distant from the proposed outfall location and is therefore not likely to be affected. The nearshore and subtidal sands and muds community is influenced by variation in physical factors such as surf, wave direction, long shore drift and heavy storms much more than the other communities in the area. Further, as already indicated, abundance of one species over another varies from time to time according to the success of larval swarms (often from some distance away), and food supply (mostly allochthonous on a sandy, intertidal shore). Accordingly it is not surprising that quantitative samples may vary to a greater extent than expected from sampling error. The situation is further complicated by the tendency of some organisms of this environment to move, often in herds. The sand dollar, for example, tends to orient itself with respect to the low tide line or some level below low tide, (as an upper limit) but will move laterally for some distance throughout the season (Merrill & Hobson, 1970). This orientation with respect to depth suggests that raised obstructions, such as a pipe line on the bottom, may interrupt such movement, as they may not change their depth orientation.

Seaward of this zone two sets of samples have been made in connection with other surveys (PG&E) which indicate the character of the bottom associations in this part of Monterey Bay (Table I-1).

Brief accounts of the characteristic benthos for these stations are as follows:

Station 21 is located 10,500 feet south of Moss Landing at a depth of nine fathoms (54'). Animal abundance by percent composition and mean weight is shown in Table I-1. The bottom fauna consisted primarily of an amphipod-ostracod-sand dollar (Dentraster excentricus) association. The spionid polychaete Prionospio pygmaeus and the bivalve Tellina buttoni were also abundant. Later studies in 1968 found juvenile sand dollars as the dominant animal, with ostracods and spionid polychaetes close behind. The mollusk Hiatella artica also comprised a substantial amount of the sample. This station appeared to

Table 25

MARINE BIOTIC COMMUNITIES OF THE MONTEREY BAY AREA

Community	Locations and Examples	Characteristic Plants	Characteristic Animals
Open coast	Rocky shore: mostly subject to wave and tidal action, along coast of Monterey Peninsula beginning at Municipal Wharf No. 1. Examples: Cannery Row, Hopkins, Marine Station, Point Pinos.	Prasiola sp., rock weeds (Fucus; Pelvetiopsis), sea lettucs (Ulva sp.), Endocladia and many other algae, surf grass, (Phyllospadix), and goats beard (Aruncus vulgaris).	Periwinkles (Littorina planaxi), limpet (Colisolla sp.), acorn barnacles (Balanus glandula), brown barnacles (Chthamalus dalli), mussels (Mytilus californianus) goose barnacle (Pollicipes polymerus), and ochre sea star (Pisaster ochraceus), seagulls, brown pelican (Pelacanus occidentalis), double crested cormorant (Phalacrocorax auritus), Brandt's cormorant (P. pencillatus), phalaropes (Phalaropus sp., Steganopus sp. Lobipes sp.)
	Sandy beach: exposed inner coast of Monterey Bay from Santa Cruz to the Monterey Peninsula. Examples: Zmudowski, Monterey, Marina, Seaside and Salinas River Beaches.	Surf grasses (Phyllospadix torreyi and P. scouleri), beach and sand verbena (Abronia latifolia and A. umbellata).	Great beach hopper (Orchestoidea californiana), pill bug (Ligia occidentalis), mole crab (Emerita analoga), Pismo clam (Tivela stultorum), bean clam (Donax gouldi) various polychaetes, killdeer (Charadrius vociferus), spotted sand piper (Actitis macularis) and various seagulls. At or below low tide: Sand dollar (Dendraster excentricus), amphipods (Eohaustorius sp.), various polychaetes, tellinid clams (Tellina sp.).
Coastal strand	Beaches and sand dunes along inner coast of Monterey Bay from Moss Landing to Monterey Municipal Wharf No. 2. Examples: Salinas River State Beach, Fort Ord	Silky beach pea (Lathyrus littoralis), sea rocket (Cakile edentula), Hottentot and sea figs (Mesembryanthemum edule and M. chilense), marrom grass (Ammophila arenaria), coast eriogonum (Eriogonum latifolia), blue beach lupine (Lupinus chamissonis), sand verbena (Abronia sp.), beach primrose (Oenothera cheiranthifolia) and beach morning glory (Convolvulus soldanella).	California legless lizard (Anniella pulchra), black-tailed jackrabbit (Lepus californicus), brush rabbit (Sylvilagus bachmani), Salinas Valley kangaroo rat (Dipodomys sp.), sanderling (Crocethia alba), snowy plover (Charadrius alexandrinus and killdeer (Charadrius vociferus).
Coastal salt marsh (and estuary)	Salt marshes in semi-protected estuaries and sloughs along Monterey Bay.	Pickleweed (Salicornia ambigua), sea blite (Suaeda californica), march grindelia (Grindelia cuneifolia), marsh rosemary (Limonium commune), saltgrass (Distichlis spicata), salt brush (Atriplex leucophylla) and California cord grass (Spartina foliosa). At or below low tide: eel grass (Zostera marina).	Bay mussels (Mytilus edulis), horse mussel (Volsella diegensis), eastern and Pacific oysters (Crassostrea virginica and C. gigas) bent-nosed clam (Macoma nasuta), Washington clam (Sacidomus nuttallii), gaper clam (Tresus nuttallii), Japanese little-neck clam (Tapes semidecussata), barnacles (Balanus sp.), ghost shrimp (Callianassa sp.), sanderlings (Crocethia alba), red-winged blackbird (Agelaius phoenicus) marsh hawk (Circus cyaneus), western grebe (Aechmorphorus occidentalis), and American coot (Pulica americana).

be fairly homogeneous where the fauna was evenly distributed rather than in clumps. The visible amount of organic debris was low compared to locations farther inshore and may have reduced the habitat and relative abundance of polychaetes (Chartock, 1969).

Station 17 was located 5,200 feet south of Moss Landing at a depth of eight fathoms (48'). The eight most abundant animal taxa are shown in Table I-1.

> "Station 17 had an animal association similar to station 21. Dendraster excentricus, however, was less abundant at this station in June 1966 when compared with station 21 (Student's test level of significance 0.03). During October 1966 and July 1967, abundance of the amphipod Eohaustorius sencillus was greater at station 21 than 17. This pattern conforms to the general picture of greater crustacean abundance offshore than near shore. Although differences in animal abundance between dates were statistically significant in many cases, these changes did not represent changes in the animal associations, as seasonal and clumping variations did not alter these groupings." (Chartock, 1969)

In the 1968 study, the benthic fauna was dominated by Dendraster excentricus, ostracods and spionid polychaetes, in that order. As in Station 21, Hiatella arctica was also the dominant mollusk.

Shoreward of the surf and subtidal zones are several characteristic maritime and lowland associations or biotic communities. The two most vulnerable to the construction phase of any project involving a marine outfall are the coastal strand and coastal salt marsh. They are included in Table 25 and summarized as follows:

Coastal Strand. At the central and southern periphery of Monterey Bay, the coastal strips are characterized by a continuous relatively narrow sand beach without rocky promontories. Behind this beach are low shifting sand dunes graduating up to higher semi-stabilized sand dunes. Vegetation in the beach and dune area is generally low or prostrate, often succulent and usually late-flowering. Due to the shifting nature of the sand and the shallow-rooted vegetation, the dune communities are rather fragile environments of limited range. The largest and least disturbed length of dune habitat lies between Moss Landing and the Fort Ord military reservation. Representative plant and animal species for the coastal strand community are given in Table 25. Due to human influences upon the sand dunes, several endemic plant species have now become rare or endangered.

Coastal Salt Marsh. The coastal salt marsh community, considered to be one of the most ecologically significant communities of the Pacific Coast, appears naturally in the study area only at Elkhorn Slough and near the mouth of the Salinas River. The old Salinas River channel and nearby ponds, although not the true tidal salt marshes, also provide valuable resting and nesting areas.

Elkhorn Slough is currently a candidate area for a national wildlife refuge. Vegetation within the salt marsh is distinctive because of its ability to withstand inundation and high levels of dissolved salts. Vegetation is generally low and often has reduced succulent leaves (e.g., pickleweed) to withstand water loss. The vast tidal expanses are rich feeding grounds for thousands of resident and migratory shorebirds and waterfowl. The main birds common to Elkhorn Slough and adjacent areas are of four types: fish eaters such as herons, egrets and terns; invertebrate eaters (snails, clams, worms) such as willets, curlews and avocets; filter feeders such as ducks; and finally the scavengers such as sea gulls.

Rare and endangered species particular to the salt marsh habitat include the California clapper rail (*Rallus longirostris*), the least tern (*Sterna albifrons*), and the salt marsh harvest mouse (*Reithrodontomys raviventris*).

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LEGAL, REGULATORY AND INSTITUTIONAL CONSTRAINTS

Introduction

The following is a checklist of governmental agencies and departments that have either regulatory authority or planning responsibility that may affect the planning and implementation of a wastewater treatment and disposal project in Monterey County. Only those permit requirements, regulatory policies and legal responsibilities that may influence a project in this area are mentioned. Those that have influenced selection of the project alternatives are mentioned in the Alternative Projects section of the report. The major implementing and regulatory agencies are listed in the first section; other permit and planning agencies are included in the two following sections.

Major Implementing and Regulatory Agencies

U. S. Environmental Protection Agency

The Environmental Protection Agency (EPA) is charged with administering the Federal Water Pollution Control Act, the Federal Clean Air Act and the Federal Safe Drinking Water Act. Under terms in the Water Pollution Control Act, EPA was required to prepare and enforce minimum water quality standards for the nation. The 1972 amendments to this act established the National Pollution Discharge Elimination System, which allows EPA to require a permit for any discharge of waste materials to a waterway. Because California has an equivalent to the Water Pollution Control Act (Porter-Cologne Act), the federal government has delegated major authority to the California State Water Resources Control Board (SWRCB) in establishing and enforcing water quality standards. The RWQCB's are performing the majority of the regulatory functions. The North Monterey County wastewater treatment system is being developed to meet both state and federal discharge standards. In order to comply with the Water Pollution Control Act timetable, all treatment plants discharging to surface waters must meet the *federal secondary treatment effluent requirements* by July 1, 1977 (listed in Federal Register, Vol. 40, No. 159, August 15, 1975 - see Table N-5). By July 1, 1983, all municipal treatment facilities must have instituted "Best Practicable Waste Treatment Technology". By July 1, 1985, municipal treatment facilities must have reached

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a condition of no discharge of pollutants. In this definition, complete elimination of discharge is not implied; only elimination of discharge of pollutants, where a pollutant is defined as anything that adversely affects the quality of water necessary to support a beneficial use.

The implications of this requirement within northern Monterey County are that the Salinas and Castroville wastewater discharges must either be removed from surface waters or improved in quality so that the beneficial uses assigned to their receiving waters are not adversely affected (EPA water quality criteria to protect beneficial uses are listed in Table N-3). All ocean discharges must meet the federal secondary effluent requirement.

Under Section 208 of the Federal Water Pollution Control Act, EPA is also responsible for approving plans and programs to control "non-point" source pollution. The state must identify regions with "substantial water quality control problems" and authorize a single organization to operate "a continuing areawide waste treatment management planning process". The Association of Monterey Bay Area Governments (AMBAG) has been designated to conduct the non-point source control study in this project's study area. Agricultural runoff, sea water intrusion and mine-related pollution are some of the major non-point source targets of 208 planning. Efforts are being made to coordinate 208 planning and all Facilities Planning (including the MPWPCA Plan) in the Monterey-Salinas area.

EPA also participates in the Clean Water Grant program which funds wastewater system improvement projects. This funding system is also operated jointly with the state; the SWRCB has been given primary responsibility in administration of the program. This EIS is a required element of the application for Clean Water Grant funds.

In administering the Federal Clean Air Act, EPA has established National Ambient Air Quality Standards (NAAQS; see Table 2). These standards are designed to protect human health from the effects of chronic air pollution. Any project that creates local air pollution conditions in excess of NAAQS may have federal funding withheld. A further explanation of EPA's role in maintenance of air quality is presented in the Air Quality section of the Environmental Setting.

The Federal Safe Drinking Water Act of 1974 required EPA to set standards for drinking water quality and to establish guidelines for state regulation and enforcement of these standards. It also gave EPA the responsibility of protecting underground sources of drinking water. Protection will probably be implemented by requiring permits for injection of wastes into usable aquifers and by prohibiting waste disposal operations that will endanger the quality of drinking water sources. National interim primary drinking water regulations were recently released by EPA (Federal Register - Vol. 40, No. 248 - Wednesday, December 24, 1975). A drinking water protection program will probably be implemented by the SWRCB once it is defined by EPA. Any option of land disposal of wastewater or sludge adopted as part of this proposed regional wastewater system will be analyzed by EPA for its effects on local drinking water supplies.

California State Water Resources Control Board (SWRCB)

The SWRCB is responsible for administering portions of the Federal Water Pollution Control Act and California's Porter-Cologne Act. Under conditions of these acts, the SWRCB has required the Central Coastal Regional Water Quality Control Board (RWQCB) to prepare a basin plan for maintenance of water quality along California's central coast. The basin plan and its water quality objectives have been approved by the SWRCB. They must also review all discharge requirements placed on treatment plants in the project area by the RWQCB. The SWRCB is the administrator of California's Clean Water Grant funds and the principal reviewer of this project's application for state and federal funding, including the facilities plan.

The SWRCB basin plan - "Water Quality Control Plan Report -- Central Coastal Basin" - was adopted in 1974. The purpose of this plan was: 1) the establishment of beneficial uses (see Table N-2) for water bodies within the Central Coastal Basin, 2) development of water quality standards compatible with such beneficial uses, 3) definition of the level of treatment necessary to attain or maintain these standards and ensure continuance of the beneficial uses, and 4) description and evaluation of alternative water quality management plans (the SWRCB recommended plan is included in Appendix N). In the determination of objectives and standards in the Water Quality Control Plan, numerous other SWRCB plans and policies were adhered to; these are also listed in Appendix N. All of these water-related policies must be considered in developing a facilities plan if the SWRCB is to grant state and rederal funds toward construction of a project.

In addition, the SWRCB requires that all projects funded under the Clean Water Grant Program give consideration to conjunctive management of surface/groundwater resources with wastewater resources. Recent changes in the Clean Water Grant Program regulations (Title 23, California Administrative Code, Chapter 3, Subchapter 7) make the development of wastewater reclamation facilities a secondary objective of the Clean Water Bond Law and the State Clean Water Fund. This makes encouragement of wastewater reclamation projects an official policy of the SWRCB. Clean Water Grant funding of reclamation distribution systems has been expanded as an added incentive. The increasing emphasis on reclamation is designed to meet the growing water requirements of the state, especially in those areas that are already water-short.

The SWRCB has also prepared the Water Quality Control Plan - Ocean Waters of California which includes water quality objectives, effluent quality requirements and management principles for waste discharge to the ocean. The policies and objectives of this document must be considered if any ocean outfall is constructed as part of the MPWPCA regional treatment facility. The ocean water quality objectives of the plan are reflected in the water quality criteria for the marine life beneficial use in Table N-3. The plan's quality requirements for waste discharges are listed in Table 26.

Central Coastal Regional Water Quality Control Board (RWQCB)

California's RWQCBs have the principal responsibility for enforcing the Federal Water Pollution Control Act and the state's Porter-Cologne Act. The SWRCB establishes water quality policy and the RWQCB implement or enforce that policy by issuing waste discharge permits, establishing waste discharge requirements for individual dischargers and monitoring the quality of wastewater discharges. The SWRCB has recently adopted a Water Quality Control Plan for the central coastal basin. The water quality objectives and beneficial uses established in that plan for waters within the study area are listed in Tables N-3 and N-2, respectively. Table N-1 presents the Board's recommended treatment requirements for various wastewater disposal options that could be used in the central coastal basin. All alternatives developed for this project must satisfy waste discharge requirements which could be expected to be established by the Central Coast RWQCB. The regional board is currently enforcing a discharge prohibition to southern Monterey Bay shoreward of a line between Pt. Pinos and the mouth of the Salinas River. This plays an important role in the location of any new ocean outfalls to the bay. Other discharge prohibitions being enforced by the Central Coastal RWQCB are listed in Appendix N.

Table 26

QUALITY REQUIREMENTS FOR WASTE DISCHARGES TO OCEAN WATERS (EFFLUENT QUALITY REQUIREMENTS)

	Unit of Measurement	Concentration not to be exceeded more than:	
		50% of Time	10% of Time
Grease and Oil (hexane extractables	mg/l	10.	15.
Floating Particulates (dry weight)	mg/d	1.0	2.0
Suspended Solids	mg/l	50.	75.
Settleable Solids	ml/l	0.1	0.2
Turbidity	JTU	50.	75.
pH	units	Within limits of 6.0 to 9.0 at all times.	
Arsenic	mg/l	0.01	0.02
Cadmium	mg/l	0.02	0.03
Total Chromium	mg/l	0.005	0.01
Copper	mg/l	0.2	0.3
Lead	mg/l	0.1	0.2
Mercury	mg/l	0.001	0.002
Nickel	mg/l	0.1	0.2
Silver	mg/l	0.02	0.04
Zinc	mg/l	0.3	0.5
Cyanide	mg/l	0.1	0.2
Phenolic Compounds	mg/l	0.5	1.0
Total Chlorine Residual	mg/l	1.0	2.0
Ammonia (expressed as nitrogen)	mg/l	40.	60.
Total Identifiable Chlorinated Hydrocarbons	mg/l	0.002	0.004
Toxicity Concentration	tu	1.5	2.0
Radioactivity		Not to exceed the limits specified in Title 17, Chapter 5, Subchapter 4, Group 3, Article 5, Section 30285 and 30287 of the *California Administrative Code*.	

Source: California State Water Resources Control Board, 1972.

California Department of Health

The California Department of Health has established water quality standards for use of reclaimed wastewater in crop irrigation. These standards are described in the California Administrative Code (Title 22, Sections 60301-60357; see Appendix O). The quality of discharge waters reaching domestic water supplies is also a Department of Health concern. Wastewater must not lower domestic water supply quality below the California Domestic Water Supplies Quality Standards. The irrigation disposal and impoundment of effluent proposed in several of the project alternatives is therefore subject to Department of Health regulation and monitoring. The majority of the regulation and monitoring is actually accomplished by the RWQCBs which follow the Department of Health Standards in setting waste discharge requirements for individual dischargers. The Department of Health can also act unilaterally in ensuring compliance with the standards, however.

The State Department of Health currently has no regulation stipulating a minimum farm labor reentry period for agricultural areas irrigated with wastewater. Concern was expressed at several local public meetings that such a restriction could adversely affect the normal harvesting procedure for some crops, especially lettuce. The timing of final irrigation and harvesting is critical to getting some crops to market in the best possible condition, thereby demanding the best possible price. The Health Department does, however, have guidelines for irrigation use of reclaimed wastewater (see Appendix O). These guidelines must be considered if irrigation reuse is adopted as part of the MPWPCA regional wastewater system.

Monterey County Environmental Health Department (MCEHD).

The MCEHD has the authority to halt any violation of the California Health and Safety Code. This includes contamination of domestic, agricultural or recreational waters, creation of hazardous vector populations, or creation of hazardous working conditions on the agricultural lands of the county. The MCEHD periodically monitors local water quality in order to detect unsafe conditions. The waste disposal or reclamation and reuse options adopted as part of the plan will be monitored by the Health Department for compliance with state Health and Safety Code legal requirements and State Health Department regulations, policies and guidelines.

California Coastal Zone Conservation Commission (CCZCC)

The CCZCC was established: "1) to prepare a comprehensive, coordinated, enforceable plan for the orderly, long-range conservation and management of the natural resources of the coastal zone, and 2) during the planning period, to regulate development in coastal waters and in a 1,000-yard shoreline permit area to ensure that improper development did not undercut the plan being prepared" (California Coastal Zone Conservation Commission, 1975). The near-coastal portion of the project study area lies within the CCZCC's permit area and a large part of the remainder of the study area lies within its coastal resource management area. Any facilities construction within the permit area would be subject to CCZCC review and approval. Activity within the resource management area should be analyzed as it relates to coastal plan policy and land use proposals.

In preparing the Coastal Plan, the valuable natural resources of the plan study area were identified. Those most worthy of protection have been recommended for acquisition by the Coastal Commission. This information is being used by various state and federal agencies, including EPA, the SWRCB and the Central Coastal RWQCB to evaluate planned development along the coast. The effect of the North Monterey County Facilities Plan on these resources is considered in this EIS.

Other Permit/Regulatory Agencies

U. S. Coast Guard - would regulate pipeline construction in bay waters to ensure boat safety.

U. S. Department of the Army, Corps of Engineers - would require a Section 404 (Federal Water Pollution Control Act) permit for any dredging or placement of spoil in the bay that might accompany construction of an ocean outfall. The Corps of Engineers has been conducting studies of alternative water resources planning strategies in the Salinas-Monterey area as part of their Urban Studies Program. A report on wastewater management options for land application in the area has recently been completed by Metcalf & Eddy Engineers as part of thie urban study. The report has been used to augment wastewater management studies conducted by the North Monterey County facilities plan engineers.

California Department of Fish and Game - would require a Section 1602 (California Fish and Game Code) permit for any modifications of stream flow, banks or channels resulting from implementation of the proposed project. This includes pipeline construction across the Salinas River.

California Department of Parks and Recreation - helps to administer the National Historic Preservation Act in California; ensures protection of National Register of Historic Places sites and California Historical Landmarks from state and federally-funded projects.

California State Lands Commission - would require a lease of state property for construction of an outfall along the bottom of Monterey Bay.

Monterey Bay Unified Air Pollution Control District - would require a permit for flaring of digester gas or incineration of sludge at a new wastewater treatment plant if these operations were used.

County of Monterey - would require permits for changes in land use, pipeline construction along county roads and construction of structures on the treatment plant site. The Board of Supervisors must approve the regional wastewater plan before it can be implemented.

Local Agency Formation Commission - must issue a permit for formation of a new wastewater project implementation district.

Interested Planning Agencies

California Department of Water Resources - currently studying wastewater reclamation and its potential effect on the state's water resources; they are therefore interested in coordinating their planning efforts with the reclamation proposals of the MPWPCA Facilities Plan.

Association of Monterey Bay Area Governments - is currently conducting the 208 planning effort for the Monterey-Santa Cruz area; this effort is being coordinated with the 201 facilities planning.

Cities and Special Districts - the zoning ordinances and land use and facilities plans of the various incorporated cities and special sanitation districts must be taken into consideration in developing a regional wastewater facilities plan.

ALTERNATIVE PROJECTS

Introduction

Preparation of an EIS is required when any federally-funded or federally-regulated project will significantly affect the human environment. U. S. Environmental Protection Agency regulations for preparation of an EIS (Federal Register 38(11), 1973) require discussion and evaluation of alternatives to a proposed project when significant resource tradeoffs are involved. Section 201 of PL 92-500 also requires discussion of alternative waste management techniques. The purpose of this chapter is to briefly describe the processes and procedures which were utilized in screening a substantial number of alternatives down to the five most desirable alternatives. These five alternatives will then be described in detail in a fashion understandable by the general public. Should the reader desire more detailed technical information on treatment processes and effluent quality, he is referred to the companion document to this EIS, the "Facilities Plan for North Monterey County", prepared by Engineering Science, Inc. for the Monterey Peninsula Water Pollution Control Agency.

Objectives of Regionalized Wastewater Treatment

Regionalization of wastewater treatment as proposed by the SWRCB is actually centralization of wastewater management. It does not necessarily require consolidation of all waste flows into a single regional treatment facility. It encourages placing the management of wastewater treatment and disposal for a relatively large geographic area into the hands of a single agency. Regionalized management has in the past proven to be more reliable in operating and maintaining treatment systems than has scattered individual management units. Several degrees of regionalization have been considered in planning for northern Monterey County. Besides the complete consolidation proposed in the Facilities Plan, maintenance of separate systems for Salinas, Castroville, Marina or some combination of these areas was analyzed. Costs, environmental impact, engineering feasibility and conformance with legal requirements were all part of the analysis. The reasons for bypassing these subregional options are detailed in the following "Development of Alternatives" section.

A prime objective of regionalizing wastewater treatment is to reduce or eliminate existing and potential water quality problems in the most "cost-effective" manner. Cost-effectiveness includes three very important factors: monetary or dollar costs; environmental costs; and social costs. The most cost-effective project is that project which meets the project objectives with the lowest combined economic, environmental and social costs. Regionalization can reduce costs of attaining water quality standards by centralizing management, operation and maintenance. Environmental aspects may be minimized by restricting wastewater plants and discharges to single rather than multiple locations. The social implications of regionalization are simply that the present multiple local agency wastewater management structure can be replaced by a single regional agency. This tends to equalize both cost and quality of service throughout the area. It also simplifies government structure and agency regulation.

Besides cost-effectiveness, geographic factors and regulatory constraints make regionalization desirable in northern Monterey County. The RWQCB prohibition of discharge to southern Monterey Bay limits the number of acceptable sites for ocean discharges. Also, the fact that Salinas Valley agricultural land offers the best potential for reuse of the large volume of wastewater produced in the study area makes centralization of treatment appear the most practical approach.

The advantages of regionalization include economy of scale in construction and operation, centralization of operation and maintenance responsibility, and the ability to integrate the solution of water quality problems for a given drainage area. One disadvantage of regionalization that is often mentioned by local entities stems from the requirement that local governments enter joint powers agreements, agreements that may extend local responsibility beyond individual member control. A perhaps more significant disadvantage is the increased magnitude of problems due to malfunction or breakdown of larger facilities.

Development of the Project Service Area

One of the initial tasks of planning for wastewater facilities in northern Monterey County was to identify the most logical service area for the regional project. The initial work in this regard was conducted by the Central Coastal RWQCB as part of their basin planning process. The Central Coastal basin plan (California State Water Resources Control Board, 1975a) identified several alternative means of treating and disposing of northern Monterey County's wastewater and made firm recommendations on which cities and communities should be considered for service. It also established a possible timing sequence for consolidation of wastewater treatment in the area.

The basin plan recommendations include as a first step, consolidation of the Pacific Grove and Monterey treatment systems with discharge through the existing Monterey outfall. A project to accomplish this is already out to bid. Subsequently, the plan recommends consolidation of wastewater flows from the Monterey plant, the Seaside plant, Ft. Ord, the Marina County Water District plant and the two Salinas plants for discharge through an outfall to central Monterey Bay. For the Castroville area, the basin plan suggests that it be tied to the new regional system once existing unsewered areas, including Moss Landing, Oak Hills and Prunedale, are sewered. As an interim step, it recommends transport of Moss Landing wastes to Castroville for a joint land disposal project, possibly to act as a demonstration of irrigation reuse potential. Small, unconsolidated residential areas around Salinas (Gabilan Acres-Oak Knolls and Toro Park) are encouraged to tie into the Salinas treatment system, thereby becoming part of the regional system.

These recommendations for consolidation of sewer service provided the major building block in establishing a service area for the north Monterey project. Within this framework, Engineering Science, Inc. conducted interviews with the area's public works and planning departments in order to identify likely directions of growth beyond existing sewered areas during the facilities planning period. Land use plans and records of septic tank problems were also reviewed. Finally, census tract data were used to identify population densities in rural areas; service area boundaries were then drawn to include existing served areas, rural areas of moderately high population density, developed areas with serious septic tank problems, and areas expected to be developed within the planning period to densities that could be economically serviced. Figure 2 shows the existing sewered area and the potential sewered area identified in this process; together they form the anticipated project service area.

Development of Alternatives

In June, 1975, Engineering Science, Inc. presented the first of a series of working papers to the Monterey Peninsula Water Pollution Control Agency, the title of this paper being "Alternative Courses of Action". In this working paper, 165 alternatives for regional wastewater management were discussed and presented schematically. Among these 165 alternatives, treatment facility locations ranged from one regional plant (to be generally located near Highway 1 and the Salinas River) to a regional plant with a number of outlying sub-regional plants, to maintaining and expanding all existing plants and not constructing a new regional facility. Combinations of these locations produced 14 location alternatives. Subsequently, eight additional system-wide alternatives increased the total to 173. It should be emphasized that regionalization means regionalized wastewater management in the most cost-effective manner, but not necessarily that all flow is contributed to a single regional treatment facility. The regionalization concept and the SWRCB's desire for its implementation are included in the basin plan for the Central Coast area (California State Water Resources Control Board, 1975a). This basin plan policy accounts for the emphasis given to regional systems in developing alternatives for the north Monterey area.

In combination with the various treatment facility locations, five methods for effluent reuse/disposal were considered. These reuse/disposal methods included:

1. Ocean Disposal - A new ocean outfall into Monterey Bay, originating near the mouth of the Salinas River and/or extension of the existing Marina Outfall.
2. River Disposal - Discharge to the lower Salinas River near the Highway 1 Bridge, and/or upstream near Salinas.
3. Unrestricted Irrigation - Irrigation of agricultural lands with no restriction on the method or rate of application (i.e. either flood, row or sprinkler irrigation) or the type of crop irrigated.
4. Groundwater Injection - Injection into the groundwater basin to form a seawater intrusion barrier.
5. Percolation/Irrigation Disposal - Percolation to the groundwater basin using percolation ponds or disposal by high-rate irrigation using special disposal sites (this can also function as partial treatment of wastewater).

Combinations of the treatment facility locations with various reuse/disposal concepts produced the aforementioned 173 alternatives. At a Technical Advisory Committee (TAC) meeting on June 27, 1975, detailed consideration was given to the many concepts utilized in the development of the initial 165 alternatives. Out of these deliberations, the TAC determined that the following concepts were infeasible, and should not be considered further:

1. The option of enlarging or upgrading treatment levels at each of the individual Monterey Peninsula treatment plants (Monterey, Seaside, Ft. Ord, Marina) in order to meet future discharge requirements was rejected. A key consideration in this decision was that if all treatment facilities were to discharge to a common

interceptor leading to a single reuse/disposal location, all effluent should receive a similar level of treatment. This would be difficult with multiple treatment plants. Also, if tertiary treatment were necessary, it should most logically be conducted at a central location where costs could be reduced. There was no appreciable difference in cost between conveyance of raw sewage and treated effluent.

2. Extension of the existing Marina Outfall for the purpose of serving only Marina was determined to be relatively expensive and infeasible. Extension of the outfall would be required by the RWQCB, as they have established a "no-discharge" zone landward of a line drawn between Point Pinos and the mouth of the Salinas River (see Figure 24). The Pacific Grove Marine Gardens Fish Refuge and the Hopkins Marine Life Refuge (designated as Areas of Special Biological Significance by the SWRCB) are located within this zone.
3. Tertiary level treatment at Castroville and the use of the effluent for local agricultural irrigation was determined to be infeasible by the project engineers. The principal basis for this decision was the high cost of treating a relatively small flow, and the necessity of using prime agricultural land for the plant expansion.

Based upon these decisions made at the June 27, 1975 TAC meeting, the number of remaining alternatives was narrowed to 45. Over the next three months, Jones and Stokes Associates, Inc., and their subcontractors worked with Engineering Science, Inc., to further narrow down the remaining 45 alternatives on the basis of both environmental and economic considerations. From an environmental standpoint, the major distinguishing characteristics between the remaining alternatives related to the method of reuse/disposal which would be used for the treated effluent. A matrix was prepared to evaluate the environmental impacts of various reuse/disposal options. The following impacts were considered in the matrix:

Potential Areas of Adverse Impacts

1. Soil quality
2. Salinas River flow
3. Ocean/estuarine water quality
4. Health hazard - land area
5. Health hazard - ground and surface water
6. Energy consumption
7. Aesthetics

Potential Areas of Beneficial Impacts

1. Groundwater supplies
2. Salinas River water quality
3. Ocean/estuarine water quality
4. Health hazard elimination - Salinas River
5. Salt water intrusion prevention
6. Water reuse

This matrix was extremely helpful in further narrowing the number of alternatives, but it was felt that this evaluation should not totally eliminate any major reuse/disposal option (land, ocean or river). The following additional decisions were also made during the screening process:

1. With the exception of the least expensive alternative, ocean disposal, any alternative must include at least some effluent reuse to receive further consideration.
2. Alternatives incorporating the Castroville Irrigation Project would only be retained if they utilized the entire amount of effluent from the study area during the irrigation season. This decision was made because utilization of less than the entire flow would probably prove uneconomical.

Other events during this three-month period included:

1. Development of three new alternatives based upon ideas developed by staff of member agencies.
2. Release of a preliminary draft report entitled, "Progress Report on Land Application of Wastewater in the Salinas/Monterey Bay Area". This report was prepared by Metcalf & Eddy Engineers under a contract with the U. S. Army Corps of Engineers. It identified three new alternative projects involving land application. These three alternatives utilized infiltration/percolation for disposal and/or long-term storage and were added to the list of remaining alternatives. A full draft of this report has since been released by the Corps of Engineers (Metcalf & Eddy Engineers, 1975).
3. Alternatives discussion and analysis at public workshops in Monterey (September 10, 1975) and Salinas (September 11, 1975).

Following the analysis of comments received at the public workshops, (which included strong support for beneficial reuse of wastewater) as well as the additional economic and environmental analyses conducted by Engineering Science, Inc., and Jones & Stokes Associates, Inc., the list of remaining alternatives was further narrowed to 21. These remaining alternatives were presented and discussed in a third Engineering Science Working Paper entitled "Apparent Best Alternatives", dated October 1975.

The general rationale which was utilized by the TAC in further screening of alternatives was as follows:

1. Alternatives which provided for utilization of only the City of Salinas effluent for agricultural irrigation were eliminated due to higher costs when compared to a regional system.

2. When two or more alternatives would have provided essentially the same benefits, the more costly alternative(s) were eliminated.
3. When two or more alternatives would cost the same and provide somewhat similar benefits, the alternative providing the highest environmental benefit was retained and the other(s) were dropped from further consideration.

At the October 31, 1975 TAC meeting, considerable discussion took place leading to a final screening of the alternatives down to 5. These remaining alternatives are briefly described below, using the numerical designations which were assigned to them during the screening process:

Alternative 1: Abandon all local plants, construct a regional secondary plant, and dispose of effluent through a new ocean outfall (see Appendix K for further explanation of treatment levels).

Alternative 134: Abandon all local plants, construct regional tertiary facilities, and discharge effluent to the Lower Salinas River in the nonirrigation season and reuse effluent for agricultural irrigation during the irrigation season. A surface storage reservoir would be constructed and used to store water while the *nitrification* system was being prepared for use (added in December 1975 working paper).

Alternative 166: Abandon all local plants, construct regional secondary and tertiary facilities, discharge secondary effluent to a new ocean outfall during non-irrigation months and use tertiary effluent for agricultural irrigation during the summer (major irrigation) months.

Alternative 170: Abandon all existing plants, construct regional secondary and tertiary facilities, and utilize all effluent for agricultural irrigation. A large surface storage pond would be constructed to store effluent during the non-irrigation season until it is required during the irrigation season.

Alternative 171: Abandon all existing treatment facilities, construct regional secondary and filtration facilities, and construct ponds to percolate effluent to the groundwater basin for storage. The stored water would be extracted by pumping, and utilized for subsequent agricultural irrigation.

The estimated costs of each of these alternatives are presented in Table 27.

Description of the Selected Alternatives

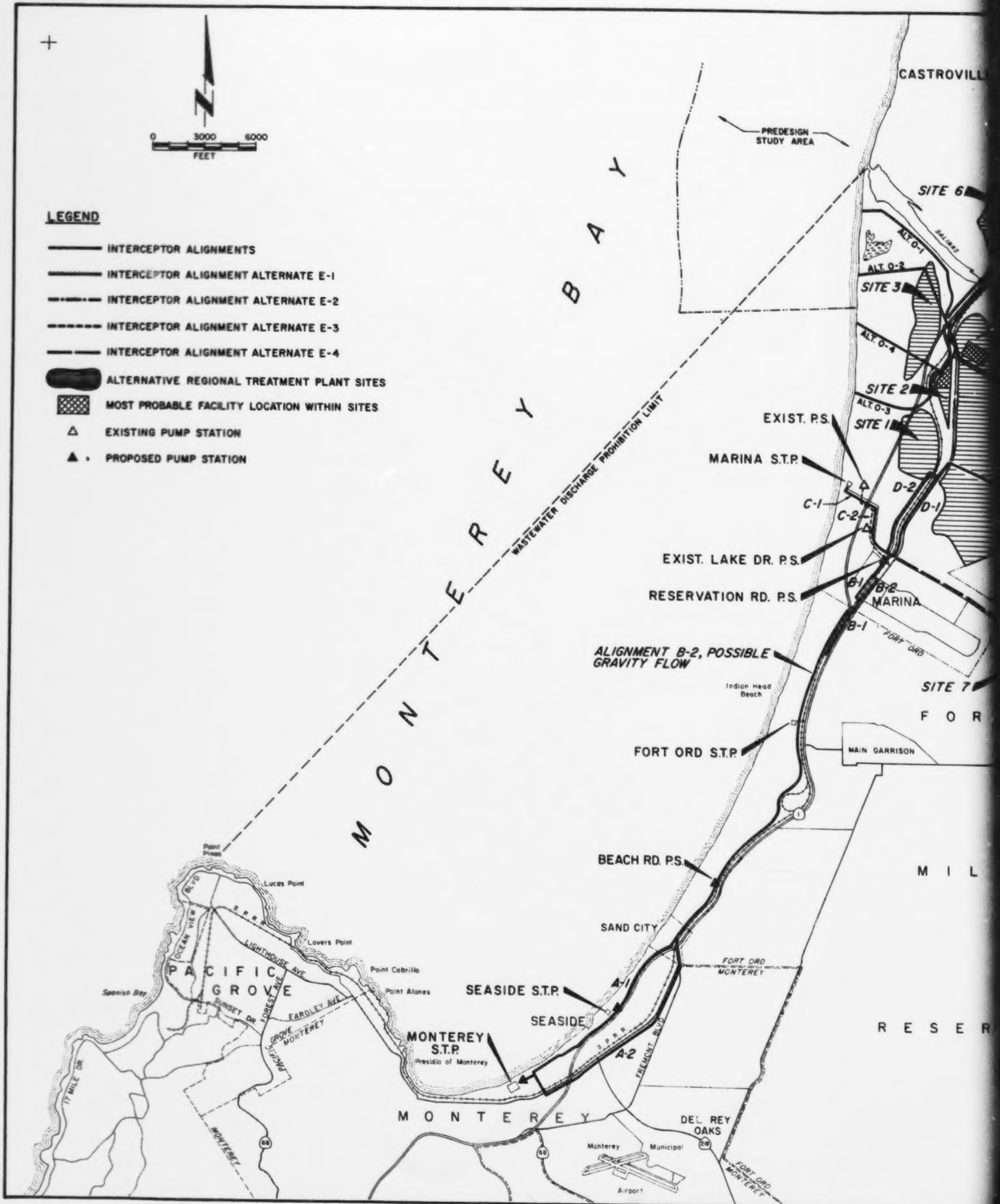
Facilities Common to All Alternatives

For the five selected alternatives, the location of the regional treatment facility and the location of the major interceptors conveying raw sewage to the regional treatment facility are identical. To avoid a substantial duplication in the discussion of the individual alternatives, as well as to increase clarity, facilities which are common to all alternatives are discussed in the following sections. The facilities are the same for each alternative because their location and size are not dependent on the ultimate treatment level or disposal/reuse option selected for implementation. The same area must be sewered and a treatment plant must be constructed regardless of which alternative is selected.

Location of the Regional Treatment Facility. Six possible locations were initially selected for further consideration as sites for a regional facility. These six locations (Figure 30) were selected using the following criteria:

1. The site should be compatible with surrounding land use.
2. The site should not be in an environmentally sensitive area.
3. The site should have sufficient area to allow for foreseeable future expansion.
4. The site should minimize energy requirements for conveyance of raw sewage to the site, and transportation of effluent to the disposal/reuse area.
5. The site should be as close to the area of reuse as possible for any alternative that includes effluent reuse.
6. The site should not be on prime agricultural land.
7. The site should be above, or be capable of protection from, a 100-year flood of the Salinas River.

Depending on the alternative eventually selected, and thus the level of treatment to be provided, the land area required will be between 40 and 50 acres. The land area, the present land use, and other characteristics of the potential sites are described in the Site Specific Environment section.


0 3000 6000
FEET
LEGEND
INTERCEPTOR ALIGNMENTS
INTERCEPTOR ALIGNMENT ALTERNATE E-1
INTERCEPTOR ALIGNMENT ALTERNATE E-2
INTERCEPTOR ALIGNMENT ALTERNATE E-3
INTERCEPTOR ALIGNMENT ALTERNATE E-4
ALTERNATIVE REGIONAL TREATMENT PLANT SITES
MOST PROBABLE FACILITY LOCATION WITHIN SITES
△ EXISTING PUMP STATION
▲ PROPOSED PUMP STATION
MONTEREY BAY
WASTEWATER DISCHARGE PROHIBITION LIMIT
PREDESIGN STUDY AREA
CASTROVILL
SITE 6
SALINAS
ALT. O-1
ALT. O-2
SITE 3
ALT. O-4
SITE 2
ALT. O-3
SITE 1
EXIST. P.S.
MARINA S.T.P.
C-1
C-2
D-2
D-1
EXIST. LAKE DR. P.S.
RESERVATION RD. P.S.
B-1
B-2
MARINA
B-1
FORT ORD
ALIGNMENT B-2, POSSIBLE GRAVITY FLOW
Indian Head Beach
SITE 7
FOR
FORT ORD S.T.P.
MAIN GARRISON
1
BEACH RD. P.S.
MIL
SAND CITY
FORT ORD
MONTEREY
SEASIDE S.T.P.
A-1
SEASIDE
RESER
MONTEREY S.T.P.
Presidio of Monterey
S.P.R.R.
A-2
FREMONT BLVD
Point Pinos
Lucas Point
Lovers Point
Point Cabrillo
Point Alones
OCEAN VIEW BLVD
S.P.R.R.
LIGHTHOUSE AVE
PACIFIC GROVE
Spanish Bay
SUNSET DR
FOREST AVE
EARDLEY AVE
PACIFIC GROVE
MONTEREY
17 MILE DR.
MONTEREY
68
MONTEREY
68
Monterey Municipal Airport
DEL REY OAKS
218
FORT ORD
MONTEREY

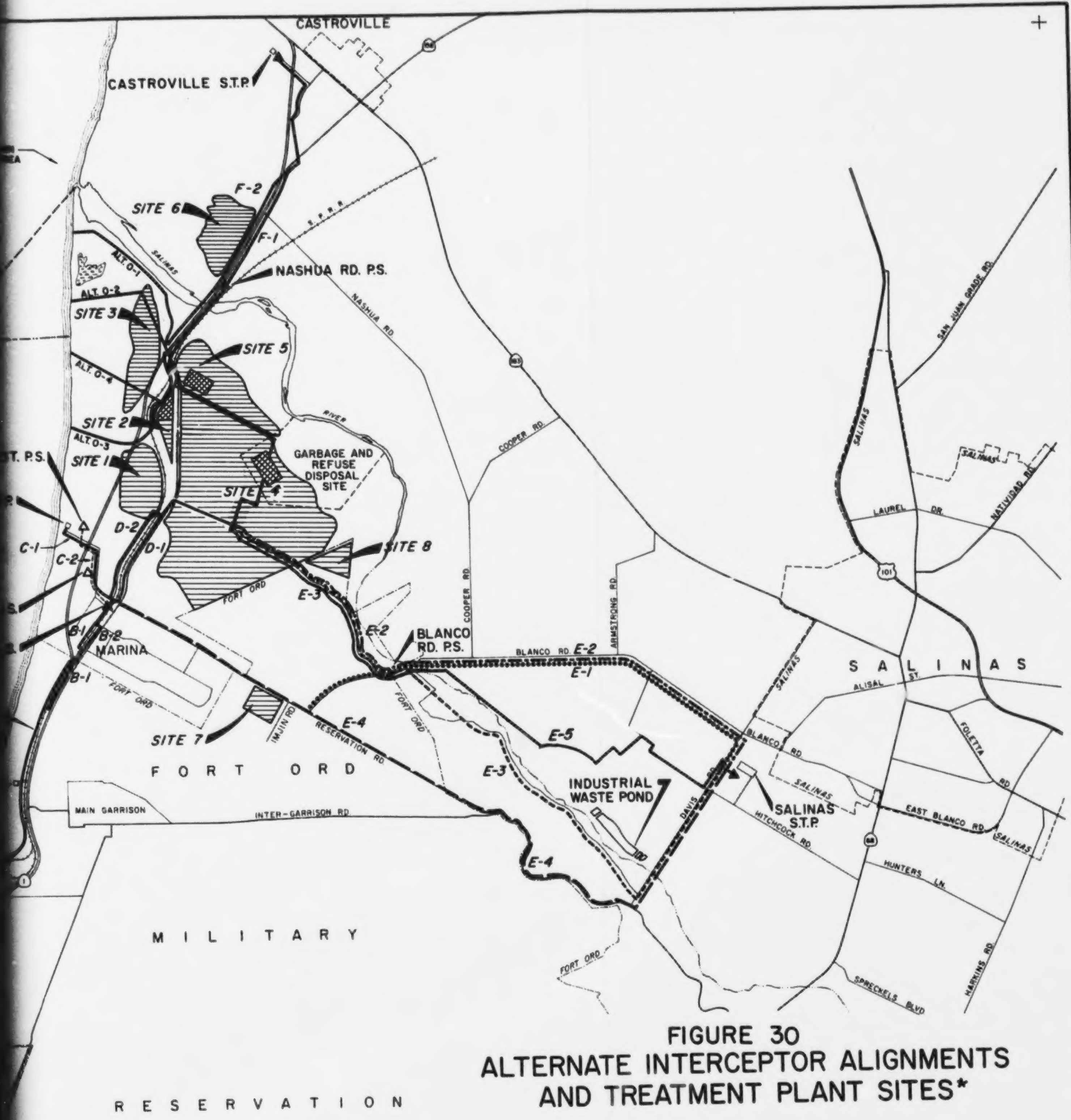

CASTROVILLE
CASTROVILLE S.T.P.
F-2
SITE 6
F-1
NASHUA RD. P.S.
S.P.R.R.
NASHUA RD.
SALINAS
ALT. 0-1
ALT. 0-2
SITE 3
SITE 5
ALT. 0-4
SITE 2
ALT. 0-3
RIVER
SITE 1
GARBAGE AND REFUSE DISPOSAL SITE
SITE 4
ST. P.S.
D-2
D-1
C-1
C-2
SITE 8
FORT ORD
E-3
E-2
BLANCO RD. P.S.
COOPER RD.
ARMSTRONG RD.
BLANCO RD.
E-1
B-1
B-2
MARINA
FORT ORD
SITE 7
IMJIN RD.
RESERVATION RD.
E-4
E-5
FORT ORD
E-3
INDUSTRIAL WASTE POND
DAVIS RD.
SALINAS S.T.P.
FORT ORD
MAIN GARRISON
INTER-GARRISON RD.
E-4
MILITARY
RESERVATION
FORT ORD
SALINAS
SAN JUAN GRADE RD.
LAUREL DR.
NATIVIDAD RD.
101
S A L I N A S
ALISAL ST.
FOLETTA RD.
BLANCO RD.
SALINAS
HITCHCOCK RD.
EAST BLANCO RD.
SALINAS
68
HUNTERS LN.
HARKINS RD.
SPRECKELS BLVD.
1
156
183

FIGURE 30
ALTERNATE INTERCEPTOR ALIGNMENTS
AND TREATMENT PLANT SITES*

*MODIFIED FROM ENGINEERING-SCIENCE, INC. 1976

Table 27

ESTIMATED COST OF ALTERNATIVES**
(in millions of dollars)

Alternative	Capital Construction Cost (1975)	Operation and Maintenance Cost (1996)	Total Present Worth* (1975 $)
1 - ocean disposal	53.8	2.2	55.6
134 - irrigation/ river disposal (levels III & IV)	69.4	2.9	68.0
(levels V & IV)	77.1	3.4	73.4
166 - irrigation/ ocean disposal	64.7	2.4	60.1
170 - irrigation/ surface storage	82.0	2.7	71.2
171 - irrigation/ underground storage	51.5	2.4	53.5

* The number of dollars that would have to be invested in 1975 to construct and operate the project until 1995.

** Detailed breakdown in Appendix M, Table M-5.

Source: Engineering Science, Inc., pers. comm., 1976.

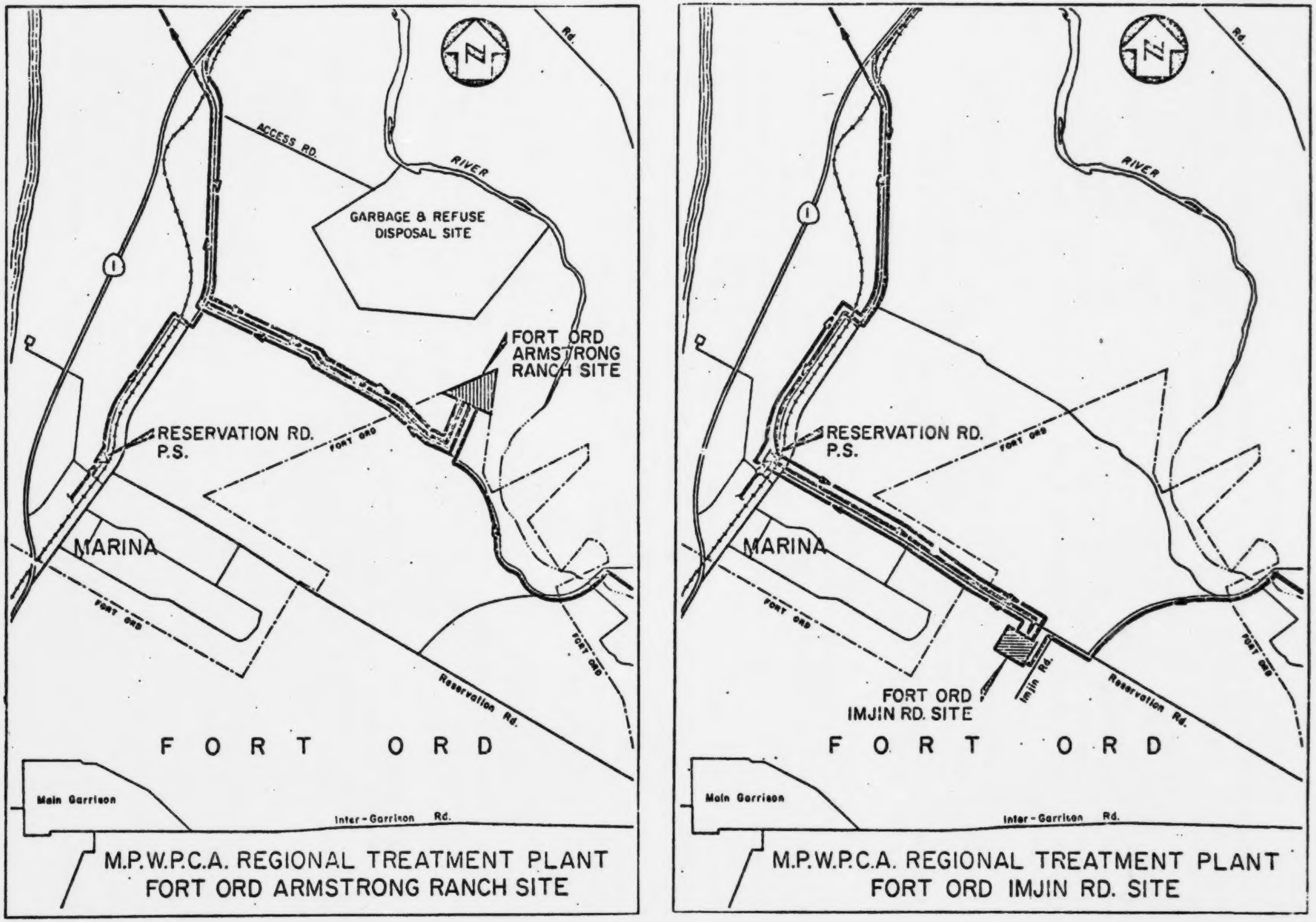
In a February, 1976, working paper (Engineering Science, Inc., 1976) the project engineers made a preliminary recommendation that Sites 2, 4 and 5 be given further detailed consideration and that the other three be dropped. Sites 3 and 6 occupy prime agricultural land and would be relatively unstable in the event of a major earthquake. They were therefore considered the least desirable for a treatment plant site. Site 1 is adjacent to the City of Marina and is likely to be developed in the near future. Therefore, it was recommended that this site also be dropped from detailed consideration. Sites 2, 4 and 5 are isolated from any significant developed areas and are supporting mainly extensive grazing operations at present. An added benefit of Sites 4 and 5 is that they have areas isolated from general public view. Site 4 was considered especially attractive in that the Marina landfill operation owns part of the site. The wastewater treatment and refuse disposal operations can be highly compatible land uses.

Subsequent to requests made at the February 1976, TAC meeting, two additional treatment plant sites were investigated by Engineering Science, Inc. (see Figure 31). The analysis was presented in the March 1976, working paper (Engineering Science, Inc., 1976b). The two sites were located on Ft. Ord property near the City of Marina. An economic evaluation of the sites by Engineering Science, Inc. and the fact that neither of these two sites appeared to provide an environmental advantage from their use when compared to the other six sites halted further consideration of their use.

Alignment of Major Interceptor Facilities. Consideration of interceptor alignment alternatives can be divided into six distinct segments, defined as follows:

Segment A - Existing City of Monterey treatment plant to Fort Ord treatment plant.
Segment B - Fort Ord treatment plant to Reservation Road in Marina.
Segment C - Marina Treatment Plant to junction with Segment B.
Segment D - Reservation Road to new regional facility.
Segment E - City of Salinas Main treatment plant to the new regional facility.
Segment F - Castroville Treatment Plant to new regional facility.

An interceptor that will transport Pacific Grove's wastewater to the Monterey treatment plant is already under design and will become a part of the regional interceptor system when the Monterey facility is eliminated.


ACCESS RD.
RIVER
Rd.
GARBAGE & REFUSE DISPOSAL SITE
FORT ORD ARMSTRONG RANCH SITE
RESERVATION RD. P.S.
1
MARINA
FORT ORD
Reservation Rd.
F O R T O R D
Main Garrison
Inter-Garrison Rd.
FORT ORD IMJIN RD. SITE
Imjin Rd.

M.P.W.P.C.A. REGIONAL TREATMENT PLANT
FORT ORD ARMSTRONG RANCH SITE

M.P.W.P.C.A. REGIONAL TREATMENT PLANT
FORT ORD IMJIN RD. SITE

FIGURE 31 PROPOSED FORT ORD TREATMENT PLANT SITES
(SOURCE: ENGINEERING-SCIENCE, INC., 1976)

Within all but Segment C, a number of alternative alignments were considered possible, as shown in Figure 30. In order to aid in the choice of the best alignments, another working paper was prepared by Engineering Science, Inc., and Jones & Stokes Associates, Inc., entitled "Treatment Plant Sites and Interceptor Alignments (Engineering Science, Inc., 1976). This working paper presented detailed discussions of the monetary cost, engineering feasibility, and a variety of environmental impacts which could be expected from utilization of the various alignments.

At the February, 1976 TAC meeting, the various interceptor alignments were considered in detail; alignments A1, B2, C1, D2, E2; and F1 were recommended by ESI. Since that time, a new alignment from Salinas has been considered and is now the engineers (ESI) recommended route (E-5).

For purposes of comparing the interceptor alignments, it was originally assumed that the regional treatment plant would be located at treatment plant site No. 2. The present engineering recommendation is to use site No. 4. The numbers presented in Tables 28 and 29 that describe the various interceptor segments include routes to site No. 4 only. If other sites are eventually chosen for use, minor adjustments to lengths and routes will be necessary in the area between Marina and the Salinas River. The anticipated size, capacity and length of each interceptor segment is listed in Table 28. Anticipated location of pump stations is shown in Figure 26, and the energy requirements of the various interceptor systems are presented in Table 29. Brief route descriptions are as follows:

Monterey Sewage Treatment Plant to Fort Ord Sewage Treatment Plant. Alignment A-1 -- new Monterey pumping station -- northeastward along Front Street, Sand Dunes Drive, Tioga Avenue to the Southern Pacific Railway and Highway 1 frontage road, thence along Beach Range Road to the Fort Ord Sewage Treatment Plant.

Alignment A-2 -- new Monterey pumping station northeastward along Front Street and Sand Dunes Drive; southeast on Tioga Avenue to Del Monte Boulevard; northeastward on Del Monte, Southern Pacific Railway, Highway 1 and Beach Range Road to Fort Ord Sewage Treatment Plant (see Figure 30).

Fort Ord Sewage Treatment Plant to Reservation Road Pump Station. Alignment B-1 -- Fort Ord Sewage Treatment Plant northward on Beach Range Road, Highway 1 right-of-way and Marina Drive to new Reservation Road pump station (force main).

Alignment B-2 -- Gravity interceptor from Fort Ord Sewage Treatment Plant northward on Beach Range Road, Southern Pacific Railway right-of-way, Highway 1 right-of-way, Palm Avenue and Marina Drive to new Reservation Road pump station (see Figure 30).

Marina Sewage System to Reservation Road Pump Station. Alignment C-1 (interim treated effluent line) -- Marina Sewage Treatment Plant easterly and southerly in Reservation Road to new Reservation Road pump station. Alignment C-1 would be used only if a staged project is selected. The initial stage would include pumping treated effluent to a regional disposal site prior to construction of a regional treatment facility.

Alignment C-2 (raw sewage interceptor to be used when Marina plant abandoned) -- pump station east of Marina Sewage Treatment Plant southward to Reservation Road, thence south and eastward within existing lines to the new Reservation Road pump station (see Figure 30).

Reservation Road Pump Station to New Regional Sewage Treatment Plant. Alignment D-1 -- Reservation Road pump station northward in Highway 1 or Southern Pacific Railway right-of-way, thence eastward and northward in the Armstrong Ranch to the regional treatment plant site.

Alignment D-2 -- Reservation Road pump station northward in a Southern Pacific Railway right-of-way and Marina Drive to a junction with Alignment D-2 at the northern terminus of Marina Drive; thence in the same alignment as D-1 to the regional treatment plant.

Salinas Sewage Treatment Plant to the Regional Treatment Plant. Alignment E-1 -- Salinas Sewage Treatment Plant westward to Davis Road, north on Davis Road to Blanco Road, west on Blanco to Reservation Road, west on Reservation Road to Highway 1, and Reservation Road pump station.

Alignment E-2 -- Salinas Sewage Treatment Plant westward to Davis Road, north on Davis Road to Blanco Road, west on Blanco Road to a point 100 feet south of the Salinas River, thence westward and northward across Fort Ord and then Armstrong Ranch to the regional treatment plant site.

Alignment E-3 -- Salinas Sewage Treatment Plant westward to Davis Road, south on Davis Road to a point 150 feet south of the Salinas River, thence northwestward in a dirt service road paralleling the Salinas River to Blanco Road; southwest on Blanco Road for 800 feet, then westward and northward across Fort Ord and the Armstrong Ranch to the regional treatment plant site.

Alignment E-4 -- Salinas Sewage Treatment Plant westward to Davis Road, south on Davis Road to Reservation Road, thence west on Reservation Road to the new Reservation Road pump station.

Alignment E-5 -- Salinas Sewage Treatment Plant westward to Davis Road, south on Davis Road to Hitchcock Road, northwest on Hitchcock Road approximately 1 mile; thence westward along a dirt agricultural service road to Blanco Road immediately north of the Salinas River; southwest on Blanco Road to a point 200 feet south of the Salinas River, then west and north across Fort Ord and the Armstrong Ranch to the regional treatment plant site.

Castroville Sewage Treatment Plant to Regional Treatment Plant. Alignment F-1 -- Castroville Sewage Treatment Plant southeast to Preston Road; then southwest along State Highway 1 to the Marina landfill site service road; east on the service road to the regional treatment plant site.

Alignment F-2 -- Same as route F-1 except along the west side of State Highway 1 from Preston Road to the landfill service road.

Wastewater Treatment Process. The project's Facilities Plan (Engineering Science, Inc., 1976d) recommends activated sludge as the best secondary treatment process. Several processes were considered at the outset, including physical/chemical treatment, land treatment and biological treatment in confined reactors (activated sludge, trickling filter, etc.). The engineering analysis concluded that physical/chemical treatment required excessive energy and chemical inputs and would degrade the effluent quality, making reuse less feasible. Two of the three land treatment systems considered possible in the Salinas-Monterey area (crop irrigation and infiltration/percolation for later withdrawal and crop irrigation) would require secondary level pretreatment (Metcalf & Eddy Engineers, 1976) and therefore would not be an alternative to the engineer's recommended secondary treatment process. The third land system, overland flow, was considered too costly in terms of land requirements. Table 30 summarizes the general character of the most feasible alternative processes. The numbers presented are general in nature and could not necessarily be applied to a specific system in the study area.

Activated sludge systems generally require more energy and are more expensive than trickling filter or land treatment systems (excluding the cost of land), but they utilize less land and require fewer chemicals (primarily chlorine). An activated sludge system also provides a better level of treatment, reducing heavy metals and BOD more efficiently than trickling filters. The level of treatment can be adjusted in an activated sludge system by altering the retention time. Land application cannot be readily adjusted to improve treatment and poses the threat of groundwater contamination in areas with high groundwater table.

Table 28

DESCRIPTION OF ALTERNATIVE INTERCEPTORS

Alignment	Length* (feet)	Diameter (inches)	Design Peak Wet Weather Flow (mgd)	Design Year	Anticipated Design (Dry Weather) Average Flow Rate (mgd)***
A-1	8,000	24 - SCSD	30.9	Ultimate	10.5
	22,000	30 - Ft. Ord			
A-2	11,300	20	30.9		10.5
	23,500	30			
B-1	10,200	30	38.9		13.7
B-2	10,200	48 (gravity)	38.9		13.7
C-1**	5,600	12	3.08		1.54
C-2**	3,800	6	1.4		--
	1,800	8	1.8		--
D-1	18,200	36	45.4		15.24
D-2	18,200	36	45.4		15.24
E-1	41,800	36	27.3	2,000	13.07
E-2	45,000	36			13.07
E-3	50,500	36			13.07
E-4	44,800	36			13.07
E-5	39,000	36			13.07
F-1	23,000	12	3.6		1.56
F-2	23,200	12	3.6		1.56

* Assumes treatment plant located on Site 4.

** There are no alternate alignments; C-1 is alignment required for treated effluent and C-2 is alignment required after Marina Sewage Treatment Plant is abandoned.

*** Based on observed per capita flow rates and projected population.

Source: Engineering Science, Inc., pers. comm.

Table 29

ENERGY REQUIREMENTS OF INTERCEPTOR ALTERNATIVES

Alignment*	Number of Pump Stations	Estimated Annual Kwh Consumption Pumping Raw Sewage	
		1980	2000
A-1**	2	2,590,000	4,102,000
A-2	2	2,626,000	4,223,000
B-1	1	479,000	782,000
B-2**	Gravity		
C-1**	Gravity	---	---
C-2**	1	---	---
D-1	1	2,862,000	3,962,000
D-2**	1	2,862,000	3,962,000
E-1	2	4,893,000	8,549,000
E-2	1	2,221,000	3,871,000
E-3	1	2,246,000	3,962,000
E-4	2	5,863,000	10,094,000
E-5**	1	2,200,000	3,800,000
F-1**	2	153,000	644,000
F-2	2	153,000	644,000

* Assumes treatment plant located on Site 4.
** Alignment recommended in Draft Facilities Plan.

Source: Engineering Science, Inc., pers. comm.

Table 30

COMPARISON OF ALTERNATIVE TREATMENT PROCESSES

	Physical/ Chemical[1]	Biological Activated Sludge	 Trickling Filter	Land Treatment[2]
Land requirements (acres/mgd)[3]	9	19	20	540[4]
Energy requirements (Kwh/day)	9,680	5,004	3,044	1,270
Personnel requirements (man years/year)	15.1	11.1	6.2	5.5
Chemical requirements (pounds/day	21,000 lime; 21 polymer; 26,500 CO_2 3,885 C 420 chlorine	670 chlorine	840 chlorine	840 chlorine
Capital costs	$4,100,000	$4,110,000	$3,810,000	$2,210,000[5]
Operating costs (cents/1,000 gallons	14.5	7.4	6	4

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[1] Coagulation, filtration, carbon adsorption.

[2] Overland flow - other methods (crop irrigation and infiltration-percolation with recovery for crop irrigation) would require secondary pretreatment or would require a larger land area than is available in the study area (Metcalf & Eddy Engineers, 1976).

[3] Includes land for treatment plant and liquid disposal (not for sludge treatment or disposal).

[4] From Metcalf & Eddy, 1976.

[5] Does not include cost of acquiring land for liquid disposal.

Source: Battelle Memorial Institute, 1974. All figures for a 10 mgd treatment plant.

There are also alternatives to the conventional tertiary treatment processes being proposed for the irrigation alternatives -- 134, 166 and 170. Predesign of the tertiary facilities has not been completed, but system costs to date have assumed use of *chemical coagulation*, sedimentation, filtration and chlorine disinfection in order to achieve treatment beyond secondary requirements. Ozonation, a relatively new process, has been tested and utilized as an alternative to conventional tertiary treatment. Tests conducted for the Chino Basin Municipal Water District in Orange County, California by James M. Montgomery, Consulting Engineers, showed that ozonation of secondary effluent from an activated sludge system is capable of producing an effluent quality at least as good as standard tertiary treatment with significantly better virus removal (James M. Montgomery, Consulting Engineers, Inc., 1975). The small-scale prototype tested also required considerably fewer chemicals (i.e., alum and chlorine). Energy requirements, however, were significantly higher. Further investigation of the success of ozonation may be desirable prior to making final recommendations for disinfection at the regional plant.

The engineer's proposed method of processing the sludge includes dissolved air flotation thickening and anaerobic digestion. The necessity of subsequent dewatering depends on the outcome of the sludge disposal study being conducted by the project engineers. The additional study seeks to identify environmentally and economically feasible alternatives to standard dewatering methods, i.e., vacuum filtration, filter presses, air driers, heat treatment. (Filter presses are the only feasible method of meeting the current discharge requirements of disposing of sludge in a sanitary landfill.) These standard methods generally require large energy and/or chemical inputs. The close proximity of the Marina landfill to the proposed regional treatment plant makes it worthwhile to investigate less costly landfill dewatering-disposal schemes.

Sludge Processing and Disposal Alternatives. The sludge disposal process to be used by the regional treatment plant is yet to be determined. The Facilities Plan engineers are investigating at least three alternative methods of sludge dewatering and disposal in greater depth than is recorded in the Facilities Plan draft. These include: 1) use of the absorptive capacity of incoming solid wastes at the Marina landfill; 2) use of the moisture-holding capacity of the soils in the vicinity of the Marina landfill; and 3) provision of drains under the Marina landfill and disposal of undewatered sludge in the landfill. All three are land disposal techniques.

Table 31 on the following page compares several different sludge processing methods in terms of resource requirements. The information is generalized, reflecting only relative needs for each system. If applied to a specific wastewater system (i.e., the Monterey regional plant), the numbers could vary considerably.

The flotation-digestion-land spreading system being considered in detail by the project engineers has a low capital and operating cost and a low energy requirement. The proposed use of methane gas generated by the digestion process further increases the system's energy efficiency. The only potential shortcomings of the process appear to be the relatively large land and personnel requirements. The extra personnel would be needed to carry out the sludge spreading. Land availability in the vicinity of the proposed regional treatment plant is good at present, but further consideration of costs associated with use of the land is necessary before judging the feasibility of the proposal.

The proposed land spreading-landfilling disposal of sludge in the Class II Marina site has several potential environmental problems associated with it. The major concerns are impacts on surface and groundwater quality. If the sludge has a low solids content (less than 50 percent), which is highly likely, the RWQCB may require catchment of all overland runoff from the landfill site in order to avoid water quality degradation of the Salinas River. The high moisture content of the sludge could also lead to groundwater contamination. An extensive geohydrologic investigation of the landfill substrate would be necessary to define this threat.

There are numerous other methods available for disposal of sludge. Two reuse options that exist are soil conditioning and co-disposal with solid waste through incineration or pyrolysis. The soil conditioning option is not precluded by land spreading. If a demand exists for this use, the materials could be trucked away prior to spreading. Co-disposal could produce energy and initiate total sludge reuse, but the energy may not be needed at the plant site. The possibility of using methane gas for operating the entire treatment system is being investigated by the plant designers, Engineering Science, Inc. The location of the landfill and proposed location for the treatment plant are relatively remote from other potential users of energy generated by co-disposal. A cost-benefit comparison would have to be made to determine the desirability of supplying the generated energy to the Marina or Castroville areas or possibly to PG&E, the major energy supplier in the area.

Table 31

COMPARISON OF ALTERNATIVE SLUDGE PROCESSING METHODS

	Flotation, Digestion, Land Spreading*	Chemical Conditioning Centrifugation	Flotation, Digestion, Sand Drying	Flotation, Chemical Conditioning, Vacuum Filtration
Energy requirements (units/day)	220 Kwh	1,862 Kwh	220 Kwh	2,003 Kwh
Chemicals (pounds/day)	12-58	45-55	11-58	192-268
Land (acres)	60-260	4.1-5.5	13.7-15.4	4.3-5.8
Personnel (man years/year)	10.2-13.9	4.1-5.8	3.4-7.9	5.6-7.5
Sludge total dry weight (pounds/day)	14,000	6,990**	14,000	6,990**
Capital cost	$300,000- 400,000	$1,200,000- 1,300,000	$570,000- 640,000	$1,000,000- 1,300,000
Operating cost (cents/1,000 gallons)	2.6-2.9	3.15-4.85	3.1-4.1	4.6-7.0

* Process currently being considered in detail by the project engineers.
** Does not include centrate recycled through treatment plant.

Source: Battelle Memorial Institute, 1973. All figures are for a 10 mgd activated sludge treatment system.

Other methods of sludge disposal include incineration, spreading on soil, lagooning and ocean discharge. Incineration and ocean discharge fail to reuse any portion of the sludge. In addition, incineration requires an energy input and results in emission of air contaminants. Ocean discharge of sludge is prohibited by the SWRCB (1975a) and EPA. Lagooning requires a significant acreage of land and has adverse visual and odor impacts. It does not preclude reuse of the sludge, but the process of stripping the sludge deposit from the bottom of the lagoon would occur on an infrequent basis and would require a significant labor and equipment input.

Disinfection. The recommended wastewater disinfection method included in the Facilities Plan is *chlorination*. Chlorine dosage should range between 5-15 mg/l (Engineering Science, Inc., 1976b). Chlorination would be followed by dechlorination with SO_2 at a dosage rate of 2-5 mg/l. Other methods of disinfection have been considered, including ozonation and several types of radiation. The technology involved with these processes is still experimental and it remains to be seen how effective and reliable these alternatives are on a long-term basis. The engineer's recommended treatment system does not include filtration, thereby making it difficult to maintain proper disinfection with ozone. Ozonation also requires a relatively large energy input (Engineering Science, Inc., pers. comm.).

The Alternative Treatment and Disposal Systems

In this section, the five treatment and disposal alternatives are discussed in detail. The discussions describe facilities which would be required and how they would be operated. To make the description more comprehensible, the various levels of treatment are described only as secondary or tertiary. (Should the reader desire a more complete description of treatment process, he is referred to Appendix K.)

Alternative I. Alternative I includes regional treatment followed by ocean disposal via a deep ocean outfall. All of the existing treatment facilities would be abandoned except pumping facilities at the Monterey, Salinas, Seaside and Castroville plants, and the previously discussed interceptor system would convey raw sewage to the regional treatment facility. Septic tank and chemical toilet pumpage may be trucked to the site. This possibility is receiving further consideration by the project engineers. The new regional facility would provide Level I-A secondary treatment (see Appendix K), and would have an initial design capacity of 25.4 mgd. The initial construction of treatment facilities would require 14 acres of land out of the 30 acres ultimately required. Design flows for all alternatives are shown in Table 32.

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Table 32

TREATMENT AND DISPOSAL SYSTEM DESIGN WASTEWATER FLOWS

Tributary Area	1990 Avg (1) Dry Weather Flow mgd	1990 Peak Dry Weather Flow mgd	Infiltration/ (2) Inflow to be Treated, mgd	1990 Peak Wet (3) Weather Flow mgd	Ultimate Avg (1) Dry Weather Flow mgd	Ultimate Peak Dry Weather Flow mgd	Ultimate Peak (3) Wet Weather Flow mgd
Monterey Peninsula Communities	13.02	23.88	14.73	38.61	15.24	27.13	41.86
Salinas Area	11.23	17.52	7.34	24.86	22.00	33.00	40.34
Castroville Area	1.16	2.38	0.59	2.97	1.87	3.48	4.07
TOTALS	25.41	43.78	22.66	66.44	39.11	63.61	86.27

(1) From Table III-7
(2) From Table IX-1, estimated from I/I analysis data. SSES work may result in changes.
(3) Equals peak dry weather flow plus infiltration/inflow.

Source: Engineering Science, Inc., pers. comm.

From the regional facility, the effluent would be carried through the on-shore portion of ocean outfall to its junction with the off-shore portion. The on-shore portion of the ocean outfall would have a diameter of 54 inches and a length of from 14,200 feet (for alternative route 0-4) to 19,000 feet (for alternative 0-1). These lengths assume treatment plant Site 4 is used. The pipe would have a peak wet weather flow capacity of 87 mgd. The on-shore portion would follow one of the alignments shown in Figure 32, again assuming treatment plant Site 4 is used. If another site is eventually selected, the routes would be modified.

The off-shore portion of the outfall would have a diameter of 54 inches, be at least 6,400 feet (1,950 meters) long, and terminate at a depth of at least 72 feet (22 meters). The peak wet weather flow capacity of the off-shore portion of the outfall would be 87 mgd. Ultimate outfall length and depth have not been finalized, as some question remains regarding the acceptability of anticipated initial dilutions of the effluent plume at the engineer's proposed diffuser terminus.

The facilities engineers have recommended use of a southern alignment for the offshore portion of the ocean outfall. This alignment is further removed from Monterey Canyon than other routes analyzed and the engineers feel that the current patterns in the southern area are such that greater initial dilutions can be obtained within a range of practicable diffuser lengths (Engineering Science, Inc., 1976f).

Depending upon construction time schedules, useful life of existing treatment facilities, and a variety of other factors, implementation of Alternative 1 might possibly be accomplished in stages. If so, the major interceptors and the on-shore and off-shore portions of the outfall would be constructed first, allowing mid-bay discharge of secondary effluent from existing plants. Then, when the new regional facility was completed, existing plants would be abandoned and the major interceptors would be used to carry raw sewage to the regional plant, which would discharge treated effluent to the outfall.

Figure 33 is a schematic representation of the Alternative 1 collection, treatment, and disposal system. Table 27 presents the costs, Table 33 the energy requirements and Table 34 the chemical requirements of Alternative 1 and the other project alternatives. The energy numbers are presented in kilowatt hours of electricity, but much of the power demand would actually be met by burning methane produced in the sludge digestion process. The anticipated service lives of the new facilities for all alternatives are listed in Table 35. The schematic representations of the alternatives have been drawn assuming a regional treatment plant at Site 4. If another site is chosen, the pipelines will follow slightly different routes north of Marina.

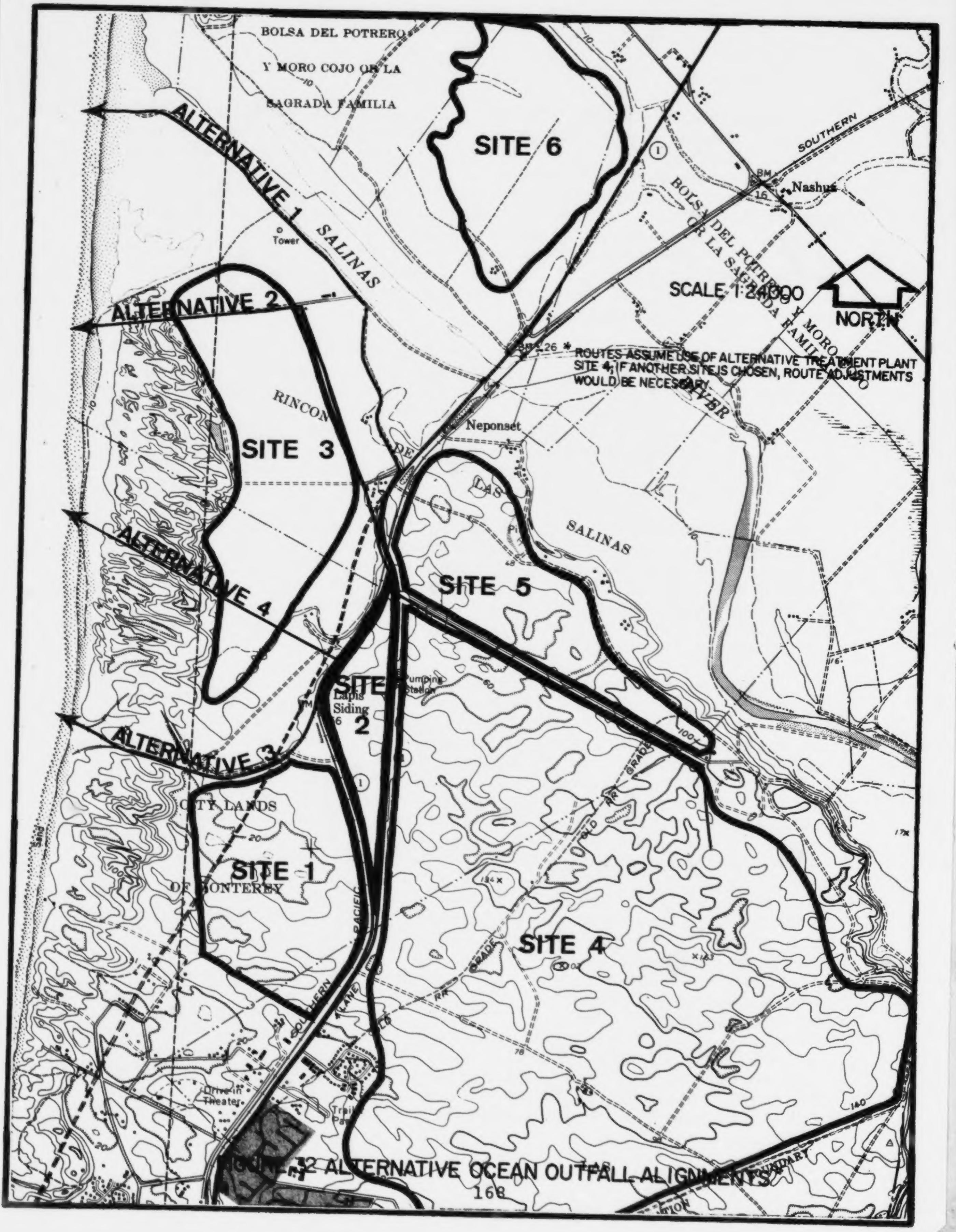
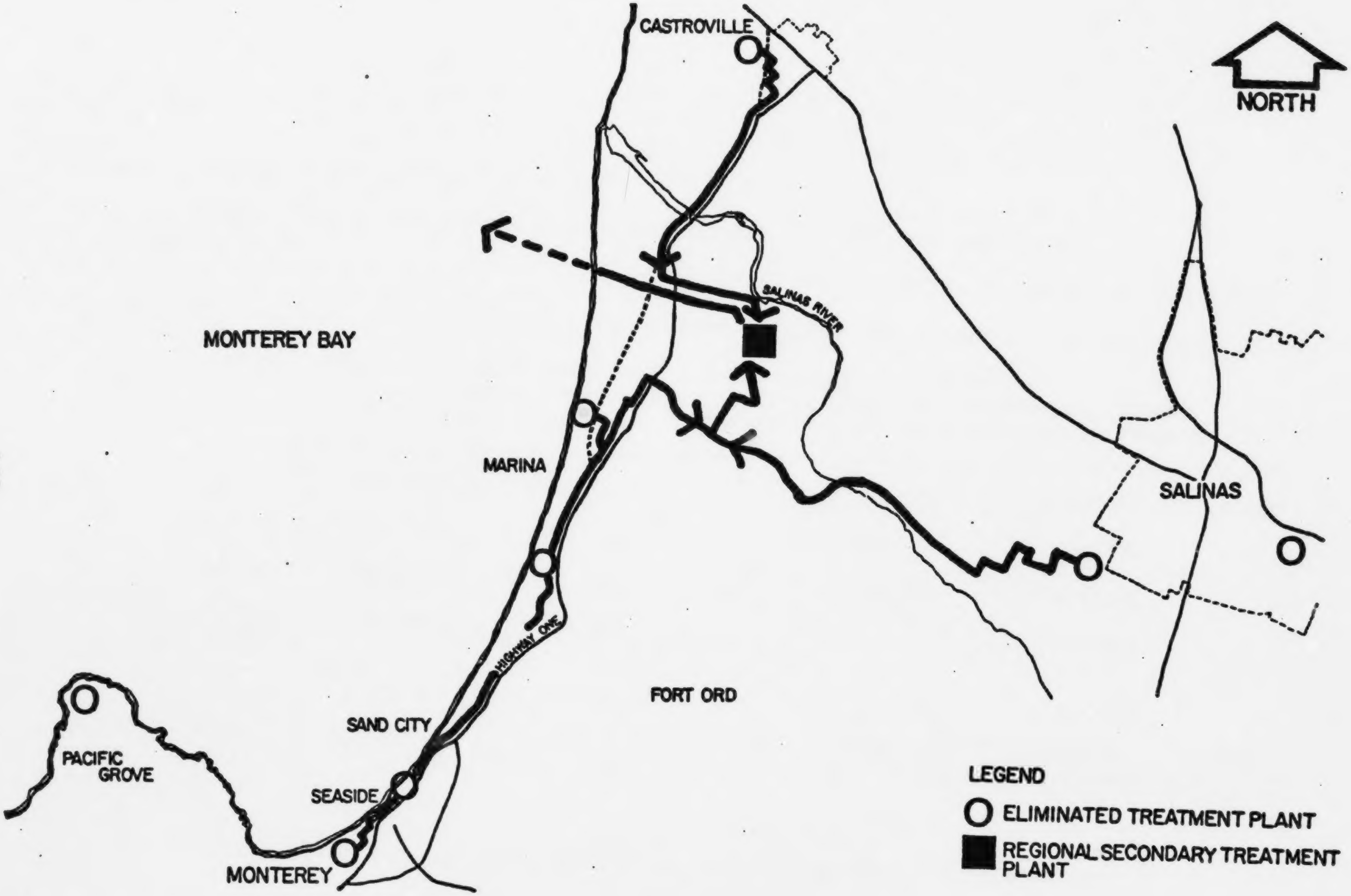

BOLSA DEL POTRERO
Y MORO COJO OR LA
SAGRADA FAMILIA
ALTERNATIVE 1
SITE 6
SALINAS
Tower
Nashua
SOUTHERN
BOLSA DEL POTRERO Y MORO COJO OR LA SAGRADA FAMILIA
SCALE 1:24000
NORTH
ALTERNATIVE 2
ROUTES ASSUME USE OF ALTERNATIVE TREATMENT PLANT SITE 4. IF ANOTHER SITE IS CHOSEN, ROUTE ADJUSTMENTS WOULD BE NECESSARY.
RIVER
RINCON
DE
LAS
Neponset
SITE 3
SALINAS
ALTERNATIVE 4
SITE 5
SITE 2
Pumping Station
Lapis Siding
ALTERNATIVE 3
CITY LANDS
OF MONTEREY
SITE 1
PACIFIC
SOUTHERN
OLD AIR GRADE
RR GRADE
SITE 4
Drive-in Theater
Trailer Park
BOUNDARY
Sand

FIGURE 32 ALTERNATIVE OCEAN OUTFALL ALIGNMENTS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SALINAS RIVER
MONTEREY BAY
MARINA
SALINAS
HIGHWAY ONE
FORT ORD
SAND CITY
PACIFIC GROVE
SEASIDE
MONTEREY
LEGEND
○ ELIMINATED TREATMENT PLANT
■ REGIONAL SECONDARY TREATMENT PLANT

FIGURE 33 ALTERNATIVE I
OCEAN DISPOSAL

Table 33

ANTICIPATED ENERGY REQUIREMENTS OF WASTEWATER SYSTEM ALTERNATIVES[1]

Alternative Number	Treatment Levels[2]	Annual Kwh Utilized, 1980			Annual Kwh Utilized, 2000		
		Collection[3]	Treatment	Disposal	Collection[3]	Treatment	Disposal
1	1A	7,826,000	6,404,000	0	12,579,000	9,853,000	0
134	III or V & IV[4]	7,826,000	8,987,000	0	12,579,000	13,826,000	0
166	IB & IV	7,826,000	6,867,000	0	12,579,000	10,564,000	0
170	IB & IV	7,826,000	6,867,000	0	12,579,000	10,564,000	0
171	II	7,826,000	6,731,000	–[5]	12,579,000	10,355,000	1,900,000

[1] Energy requirements of construction discussed in the impact section; the numbers in the table do not reflect the proposed use of methane to operate treatment plant facilities; methane from sludge digestion may eventually supply total energy needed to operate treatment plant.

[2] See Appendix K for explanation.

[3] Assumes engineer's recommended alignments and treatment plant located at Site 4 (does not include energy consumed by existing collector systems).

[4] If level V required for six months per year, increase power requirements by 91,500 Kwh in 1980 and by 140,800 Kwh in 2000.

[5] No requirement in 1980 because irrigation project probably will not begin until 1987.

Source: Engineering Science, Inc., pers. comm.

Table 34

ANTICIPATED CHEMICAL REQUIREMENTS OF WASTEWATER SYSTEM ALTERNATIVES
(pounds per year)

Alternative Number	Chlorine 1980	Chlorine 2000	Other Chemicals* 1980	Other Chemicals* 2000
1	304,400	456,600	540,200	810,300
134	608,800	913,200	609,000	913,500
166	608,800	913,200	609,000	913,500
170	608,800	913,200	609,000	913,500
171	608,800	913,200	540,200	810,300

* Includes lime, alum, ferric chloride, and sulphur dioxide.

Source: Engineering Science, Inc., pers. comm.

Table 35

SERVICE LIVES OF NEW FACILITIES

Unit	Percentage of unit	Service Life, years
Pipelines and ocean outfalls	100	50
Pumping stations	66	30
	34	15
Primary, secondary and tertiary unit processes; chlorination, including sewage sludge handling	40 60	35 20

Source: Engineering Science, Inc., 1976d.

Alternative 134. Alternative 134 includes both irrigation reuse of wastewater and discharge to the lower Salinas River. Because some controversy has developed over the level of treatment required for discharge to the lower river, two versions of this alternative are being analyzed. The first version includes two stages: 1) Construction of regional interceptors and a level III regional treatment plant for year-round discharge to the lower Salinas River while an agricultural demonstration project (described below) is in progress. 2) In the second stage, should irrigation reuse prove feasible, additional treatment facilities would be constructed at the regional plant and level IV effluent would be piped to the Castroville area for irrigation as demand dictated. During non-irrigation months, level III effluent would be discharged to the lagoon. If irrigation reuse proved infeasible in the agricultural demonstration project, the year-round discharge to the lagoon would continue indefinitely. The second analysis of Alternative 134 will be exactly as above, except treatment level V will be substituted for level III in periods of low flow (less than 10 to 1 natural flow to effluent dilution ratio) discharge to the lagoon. In both cases, all existing treatment facilities would eventually be abandoned, and the previously discussed interceptor system would convey raw sewage to the new regional treatment facility.

First stage facilities (level III or V) would have an initial design capacity of 26 mgd, and would require about 14 acres of land. Second stage facilities (level IV) would have a capacity of 26 mgd, and would require approximately 10 additional acres of land.

At the end of the growing season it would be necessary to acclimate the nitrification system for both levels III and V treatment. This process takes about 2 weeks, so a storage facility would be needed to hold the inadequately nitrified wastewater prior to recycling through the plant. The storage reservoir would be located in the vicinity of the treatment plant if possible. About 120 acres would be occupied, and the reservoir would be about 10 feet deep. It would therefore be capable of holding a full two weeks flow of effluent. Construction would be by excavation with the excavated material being used to construct a dike around the reservoir. To prevent percolation of effluent, the reservoir would be lined with plastic or clay.

Level IV treatment would be provided prior to storage. After this treatment, the effluent would flow by gravity to the storage reservoir. This same pipeline would also be used as a force main to pump the water back to the plant for further treatment prior to delivery to farmers. The alignment of the pipeline and the location of the storage reservoir have not yet been determined.

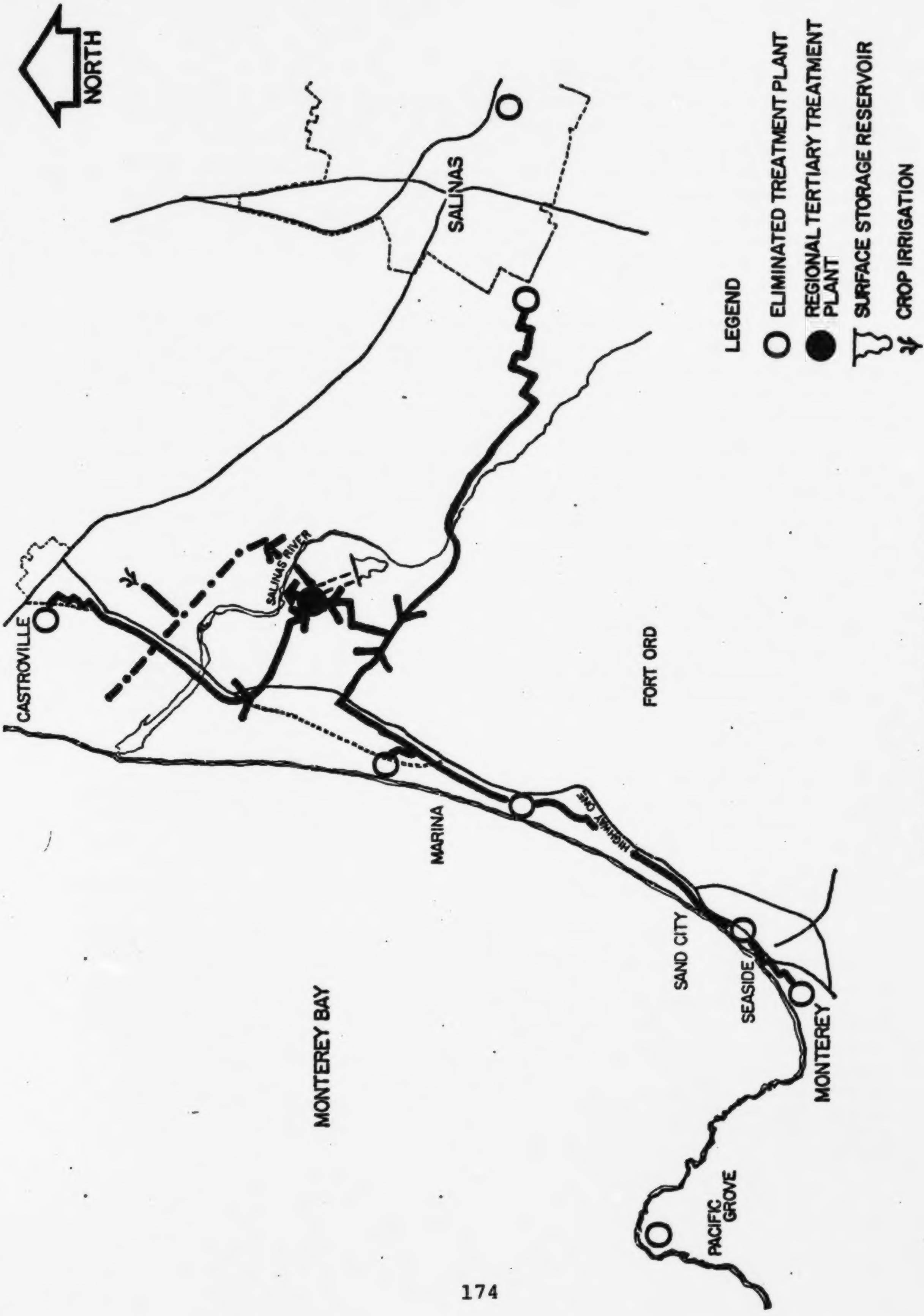
During the irrigation season, tertiary effluent would be pumped from the treatment plant to an irrigation distribution system. A gravity pipeline 36 inches in diameter would be required. When irrigation demands exceed plant inflow, water in the storage reservoir would be returned to the plant, be treated to level IV, and then delivered to the irrigation area. The general alignment of the delivery pipeline to the Castroville area is shown in Figure 34. (The exact route has not been determined.)

During the non-irrigation season, disinfected level III or V effluent would flow by gravity from the regional treatment plant to the lower Salinas River in a 54-inch diameter pipeline. Peak wet weather flow capacity would be 87 mgd. Alignment of this outfall would be generally as shown in Figure 34.

An irrigation demonstration project is being proposed as part of all irrigation reuse alternatives to determine the feasibility of irrigating Salinas Valley food crops with wastewater from a regional treatment plant. The program being developed by Engineering Sciences, Inc. would seek to answer public health, soil and crop damage, and marketability questions specific to the lower Salinas Valley area. (The technical approach of the demonstration project is described in Appendix L). It would encompass 20 to 40 acres of leased land, preferably with Pacheco soils. Four water types and two crop types would be used to properly anticipate the effects of the proposed regional irrigation project. A specific location has not been selected. This demonstration would be started during the initial stage of the overall project and would be expected to last from 2 to 5 years. Construction of the full tertiary facilities and delivery system to the irrigation area would be dependent on the results of the demonstration project. If the demonstration project was successful and a significant demand for the wastewater developed, storage facilities could be added to Alternative 134 so that some or all of the winter wastewater flows could be held for irrigation use in the spring and summer months.

Figure 34 illustrates the Alternative 134 collection, treatment and reuse/disposal system.

If irrigation of food crops proved undesirable in the lower Salinas Valley, discharge to the lower river could continue or other methods of reuse could be investigated. This might include irrigation of feed, fodder or processed food crops, deep well injection as a salt water barrier, or irrigation of parks and landscaped areas. These methods of reuse have been given some early consideration, but are considered of lower priority for a variety of reasons.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FORT ORD
MARINA
HIGHWAY ONE
SAND CITY
SEASIDE
MONTEREY
MONTEREY BAY
PACIFIC GROVE
LEGEND
○ ELIMINATED TREATMENT PLANT
● REGIONAL TERTIARY TREATMENT PLANT
SURFACE STORAGE RESERVOIR
CROP IRRIGATION

FIGURE 34 ALTERNATIVE 134
CROP IRRIGATION/RIVER DISPOSAL

Generally, food crop irrigation would maximize benefits by providing for an existing water need rather than creating a new water demand. There are no significant areas of feed, fodder or processed food crop production near the proposed treatment plant site. In order to utilize the wastewater on this type of crop, it would have to be piped a considerable distance to existing acreage or the rolling grassland north of Marina would have to be converted to irrigated cropland. Irrigating new crop areas would not help alleviate the groundwater overdrafting taking place in the lower Salinas Valley; and piping to existing fodder or processed food crop areas would require large capital and energy inputs.

Aquifer injection of wastewater as a barrier to sea water intrusion in the lower Salinas Valley was given early consideration by project engineers. In their August, 1975 working paper (Engineering Science, Inc., 1975b), several shortcomings to this reuse option were listed. These included: injection of all the region's wastewater in 1995 would balance only 50 to 60 percent of the 180- and 400-foot aquifer net withdrawals -- this would not prevent salt water intrusion; if the Castroville Irrigation Project were to proceed, the injection would be a partially-redundant effort to halt intrusion; the added cost of improving treatment and installing and operating injection wells would probably mean costs would be approximately 50 percent higher than tying into the CIP for reuse. For these reasons, the engineers recommended that the injection option not be considered further.

The California Department of Health has authority to regulate deep well (waste well) injection of reclaimed wastewater (Porter Cologne Water Quality Control Act, Chapter 7, Article 6, Section 13540). To date, they have not adopted specific injection regulations, but are considering proposals on a case-by-case basis (Spath, pers. comm.). The principal health-related concern is protection of water-bearing strata that are or may be suitable for use as a domestic water supply. There is currently only one waste well injection project in operation in California -- Water Factory 21 in Orange County. The wastewater is being used as a barrier to sea water intrusion.

Irrigation of parks and landscaped areas is also a reuse possibility. Fort Ord is already initiating a landscape irrigation reuse program. Similar projects could be started at any of the existing wastewater treatment facilities if full reuse of crop irrigation is not initiated at the regional treatment plant.

Alternative 166. Alternative 166 includes regional treatment followed by use of tertiary effluent for irrigation and discharge of secondary effluent to the ocean during non-irrigation months. All existing treatment facilities would be abandoned, and the previously discussed interceptor system would convey raw sewage to the new regional facility.

Secondary treatment facilities would be identical to those discussed for Alternative 1, and tertiary facilities would be identical to the second stage level IV facilities discussed for Alternative 134. Initial land area required would be 14 acres, with an ultimate acreage of 30.

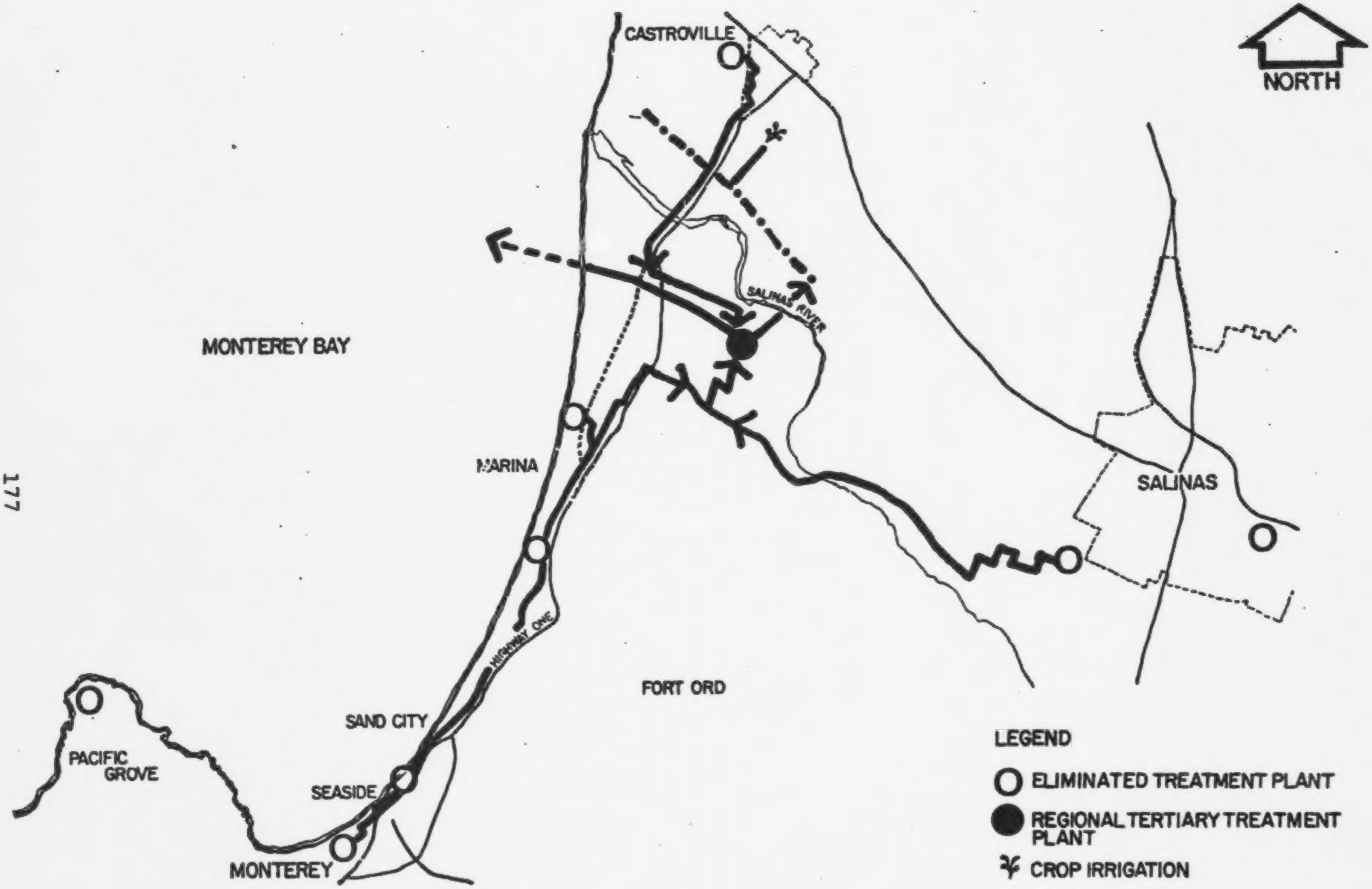
On-shore and off-shore outfall facilities for ocean disposal would be identical to those described in Alternative 1, (Figure 33). The pipeline to the irrigation area would be similar to that described for Alternative 134 (Figure 34), except that a small storage pond (40 acre-feet on 4 acres of land) would be used to balance daily irrigation demands with available effluent.

As with Alternative 1, construction of Alternative 166 could be staged. If major interceptors and the on-shore and off-shore portions of the ocean outfall were completed, they could be utilized to convey secondary effluent from existing plants to mid-Bay disposal. Upon completion of the regional secondary treatment facility, all existing plants could be abandoned and the major interceptors could then be used to carry raw sewage. The agricultural demonstration project described in Alternative 134 would also be part of Alternative 166. Tertiary facilities would be built only after the demonstration project proved wastewater irrigation of food crops feasible. If irrigation demand subsequently became great enough, wastewater storage facilities could be constructed to store winter flows and increase the total amount of wastewater available for reuse. If irrigation was found to be infeasible, ocean discharge and/or some other reuse would continue.

Figure 35 illustrates the Alternative 166 collection, treatment and reuse of disposal system.

Alternative 170. Alternative 170 includes regional treatment with reuse of all of the treated effluent for crop irrigation in the Castroville area. All existing treatment facilities would be abandoned and the previously discussed interceptor system would convey raw sewage to the regional plant. Because tertiary effluent can only be used during the irrigation season, substantial storage would have to be provided to store winter flows. The treatment and storage concepts are described in the following sections.

The treatment process to be utilized in Alternative 170 is actually a treatment-storage-treatment system. Storage is provided as an intermediate stage within the treatment process for extremely important reasons.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HIGHWAY ONE
SAND CITY
SEASIDE
MONTEREY
PACIFIC GROVE
LEGEND
○ ELIMINATED TREATMENT PLANT
● REGIONAL TERTIARY TREATMENT PLANT
CROP IRRIGATION

FIGURE 35 ALTERNATIVE 166
CROP IRRIGATION/OCEAN DISPOSAL

1. Raw wastewater cannot be stored for an extended period of time without production of noxious odors. In addition to odor production, large floating masses of green algae would soon appear across the pond surface. The combination of these two conditions would be undesirable.
2. High quality tertiary effluent cannot be stored for an extended time period either because a slight amount of algae growth is possible, a condition which would make the water unsuitable for irrigation use.

Provision of the intermediate storage dictates that the treatment facilities preceding the storage be sized based upon flow into the regional facilities, and that treatment facilities following the storage be sized according to peak irrigation demands.

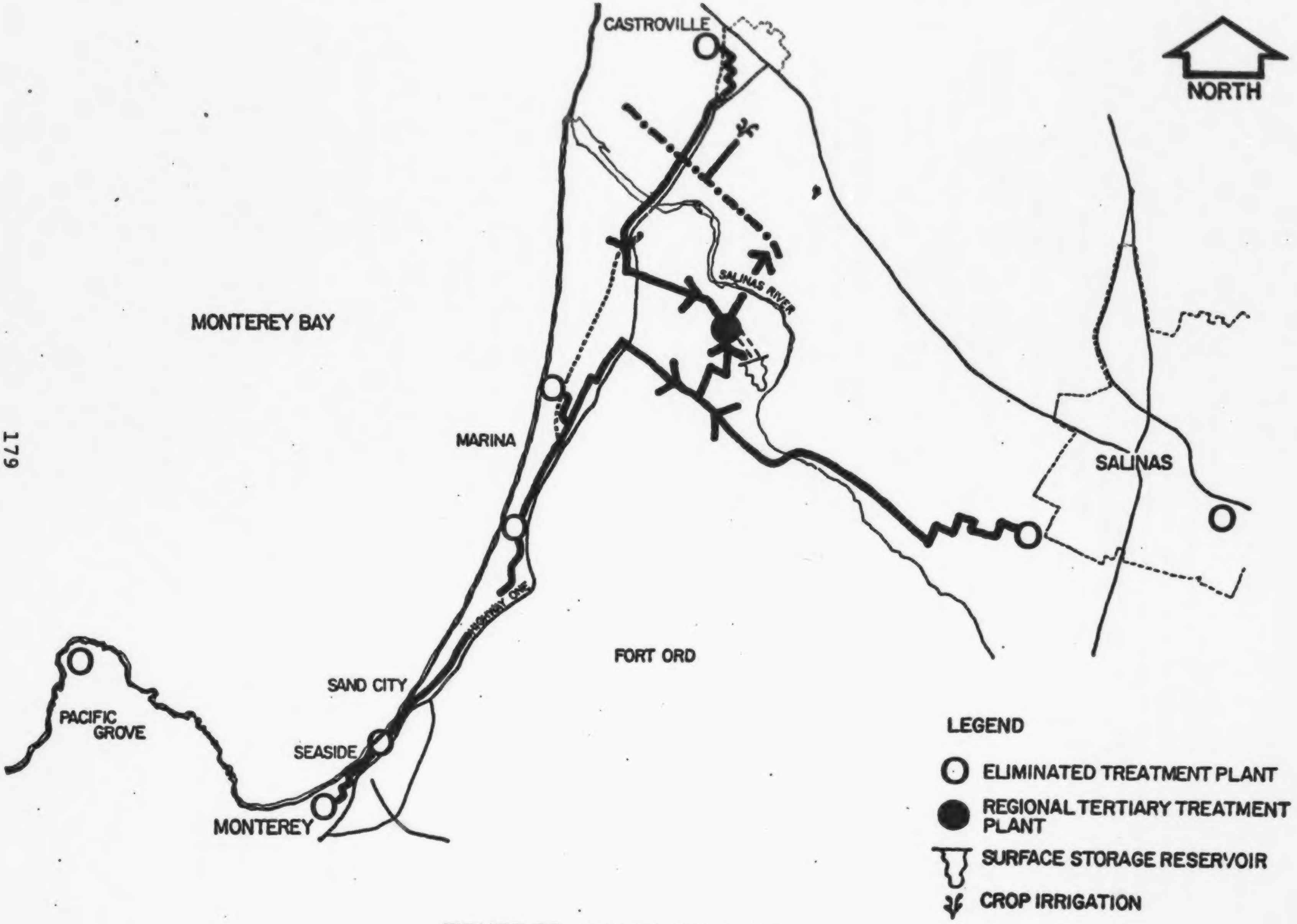
Prior to storage, secondary treatment and filtration (level II - Appendix K) facilities having an initial design capacity of 26 mgd would be constructed. Following filtration, the effluent would be pumped through a 54-inch diameter force main to a presently undetermined location. Storage facilities would probably be located in the area mapped in Figure 36, covering a surface area of roughly 900 acres, and would be capable of storing about 9,000 acre-feet of water. Excavation and sealing of the storage facility would be similar to that described for Alternative 134.

Stored secondary/filtered wastewater would be returned to the regional treatment facility by gravity flow through the same pipeline used to pump wastewater to the storage reservoir. Irrigation requirements would dictate time and rate of return. Tertiary treatment would be performed prior to delivery to the irrigation area. Fifteen acres of land would be required for the initial treatment facilities with an ultimate requirement of 30 acres.

High quality level IV effluent would flow by gravity through a 36 inch diameter, pipeline with an alignment similar to that presented for Alternative 134.

Figure 36 illustrates the Alternative 170 treatment, storage and reuse systems.

Alternative 170 is not suited to staging; therefore, all facilities must be built at the same time. The agricultural demonstration project would have to be completed prior to implementation of this alternative. Surface storage of effluent during the nonirrigation season could be added to Alternatives 134 and 166 if it proved desirable at a later date.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SEASIDE
MONTEREY
LEGEND
ELIMINATED TREATMENT PLANT
REGIONAL TERTIARY TREATMENT PLANT
SURFACE STORAGE RESERVOIR
CROP IRRIGATION

FIGURE 36 ALTERNATIVE 170
CROP IRRIGATION / SURFACE STORAGE

Alternative 171. The basic concept of Alternative 171 is to provide regional secondary wastewater treatment, then to percolate effluent into the ground, a process which will provide additional treatment as well as storage of winter-time flows until required for irrigation. When water was required, it would be withdrawn from the groundwater basin by wells. A key advantage of this alternative is the ability to reuse essentially all of the wastewater without the necessity of providing tertiary treatment or creating large surface storage reservoirs.

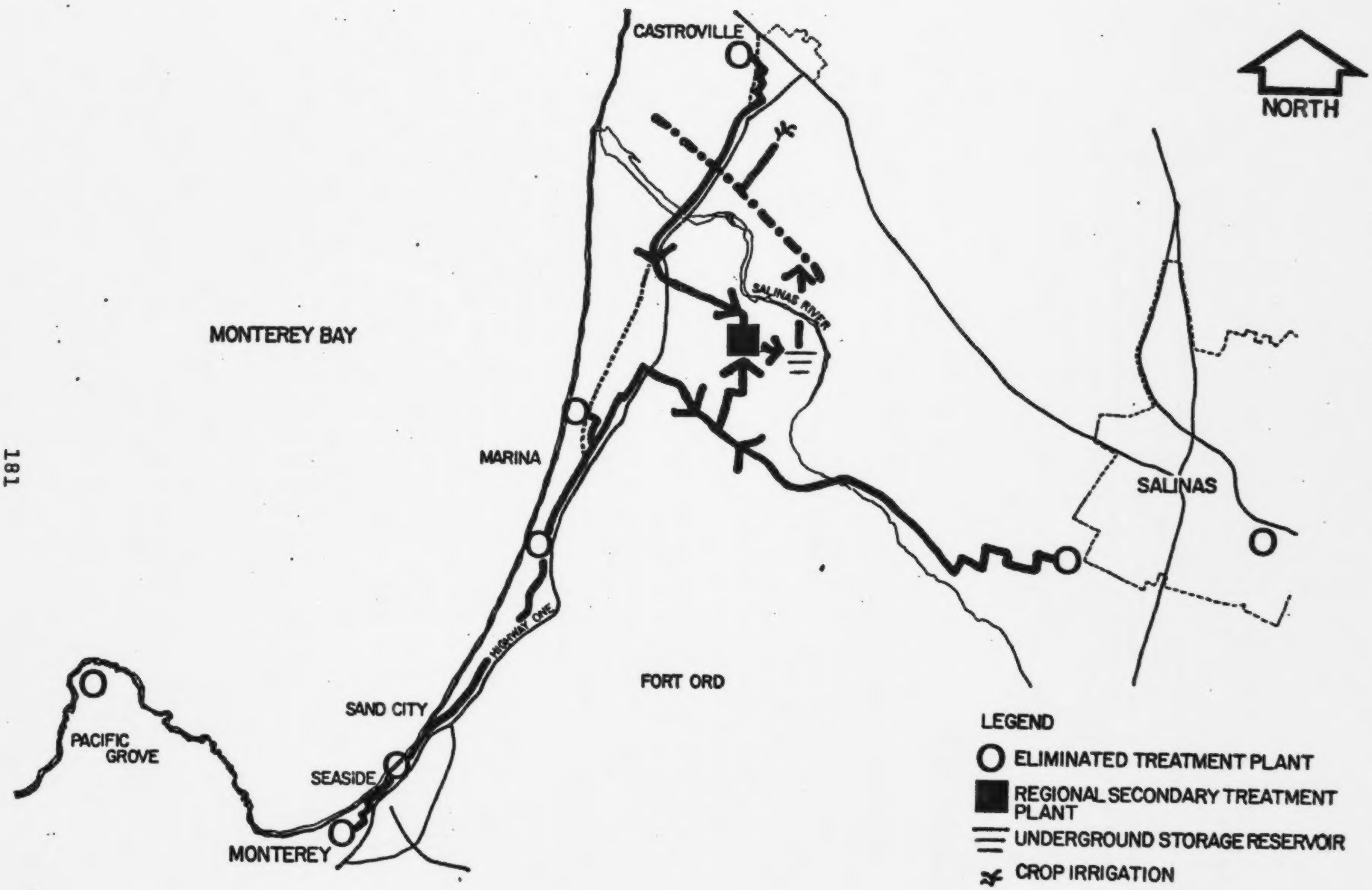
In Alternative 171, all existing treatment facilities would be abandoned and raw sewage would be conveyed to a regional treatment facility. Treatment requirements would be secondary with filtration (see Appendix K). Fifteen acres of land would be required initially, with an ultimate requirement of 30 acres.

Infiltration/percolation ponds for the treated effluent would be located in the general area of treatment plant site 4 and would occupy about 185 acres. Construction would be by excavation, with the excavated material being utilized as dikes similar to the surface storage ponds for Alternatives 134 and 170. The principal differences between percolation ponds and large surface storage reservoirs are: 1) storage ponds must be lined with an impermeable material, and 2) percolation areas must be divided into a number of ponds, each having a surface area of about 10-15 acres.

As water is required for irrigation, it would be pumped from the groundwater basin using new wells constructed as a part of this alternative. These wells would generally have a depth of 100 feet and be capable of producing up to 26 million gallons per day total capacity for all wells. Although well locations can only be determined after detailed geologic and groundwater hydrology investigation, they would be located in the vicinity of the storage area shown in Figure 37.

Water pumped from underground storage would be routed to a central location and conveyed to the irrigation area as required, through a 36-inch diameter pipeline. Figure 37 illustrates the possible alignment of this pipeline.

All components of Alternative 171 would have to be on-line prior to abandonment of existing facilities. The only deviation might be in constructing the percolation ponds and drilling the wells. Some of these facilities could be constructed at a later date as demand dictated.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LEGEND
○ ELIMINATED TREATMENT PLANT
■ REGIONAL SECONDARY TREATMENT PLANT
UNDERGROUND STORAGE RESERVOIR
CROP IRRIGATION

FIGURE 37 ALTERNATIVE 171
CROP IRRIGATION/SUBSURFACE STORAGE

Figure 37 shows the Alternative 171 treatment, storage and reuse system. As with Alternative 170, use of this treatment and reuse method would be dependent on a successful agricultural demonstration project. A relatively expensive geohydrologic investigation of the storage area would also be necessary prior to implementation of the underground storage. The possibility of contaminating potable groundwater supplies below the perched aquifer would have to be determined to avoid health hazards to present and future residents of the area. Underground storage could also be phased into Alternatives 134 and 166 if it proves feasible.

Facilities Sizing

Rationale for Proposed Sizing. All of the facilities sizes described in the preceding sections have been developed by the project engineers after considering a number of variables, including present and projected population within the proposed service area, infiltration/inflow totals, and anticipated waste and flow reduction measures. Development of the service area boundaries was described earlier. The project engineer utilized the 20-year and ultimate build-out population projections developed by local planning agencies. As noted in Table 45 and Figure 42, the local projections are higher than those developed by state and regional agencies. Capacity was included in the system (interceptors, treatment plant, disposal system) for all presently sewered populations plus those residential areas that presently have septic tank problems or those undeveloped areas that are likely to be developed in the next 10-20 years to densities sufficient to require sewering. This project does not provide a collection system for unsewered, inadequately sewered, or currently undeveloped residential areas within the service area, but it does provide major interceptor, treatment and disposal/reuse capacity. If rural communities (i.e., Prunedale, Toro Park, Oak Hills) within the service area are to eventually become a part of the regional system, individual facilities planning and environmental impact studies will have to be done.

One of the three major wastewater interceptors is designed to accommodate flows from the ultimate build-out population (Monterey Peninsula line), while the other two (Castroville and Salinas lines) are sized for the year 2000 anticipated population. The Salinas and Castroville lines are sized for year 2000 only because these two areas are experiencing relatively rapid growth at present. It would be difficult to predict ultimate populations and any miscalculation could result in improperly-sized interceptors. The engineer's infiltration/inflow analysis determined that each of the three interceptors must accommodate some infiltration and inflow into the existing collector system. Their estimates for each route are as follows: Monterey Peninsula line - 14.73 mgd; Salinas Line - 7.34 mgd; and Castroville line - 0.59 mgd (Engineering Science, Inc., 1976d).

The size of the regional wastewater treatment plant is based on the 1990 population projections developed for the service area and the estimated infiltration/inflow. Sizing does not consider growth beyond 1990 because the state-federal Clean Water Grant program will finance facilities for a 10-year planning period only. Capacity beyond that must be locally financed. The design peak wet weather flow capacity of 66 mgd includes wastewater from the 1990 population listed in Table 45 plus a total of 22.66 mgd of infiltration/inflow (Engineering Science, Inc., 1976d).

The effluent transport facilities are designed to convey ultimate peak wet weather flows (PWWF) from the service area. PWWF is a combination of peak dry weather flows from the ultimate service area population, plus the maximum anticipated infiltration/inflow. The regional systems PWWF is expected to be 87 mgd. Therefore, the ocean outfall (Alternative 1 and 166), the Salinas River lagoon outfall (Alternative 134), and the pipeline from the treatment plant to the surface and subsurface storage reservoirs (Alternatives 170 and 171 respectively) are designed to accommodate 87 mgd (Engineering Science, Inc., 1976d).

The pipeline proposed to carry treated wastewater from the regional plant to an irrigation delivery system in the Castroville area (Alternatives 134, 166, 170 and 171) has been designed to accommodate the plant's average dry weather flow of 26 mgd. Sizing of the tertiary treatment facilities beyond this level was considered too expensive by the project engineers. The irrigation delivery pipeline was not sized beyond 26 mgd because nocturnal reservoirs at the irrigation distribution stations should be able to handle daily peak demands (Engineering Science, Inc., pers. comm.).

Waste and flow reduction measures. The project engineers have proposed a variety of waste and flow reduction measures to decrease the daily load of solid and liquid wastes that must be treated by the proposed regional system. The suggested flow reduction measures are as follows:

1. Water metering
2. Incentives through water pricing
3. Public education
4. Modifications in household plumbing, including:
   a. Small tank flush toilets
   b. Low-volume shower heads
   c. Hot water pipe insulation to reduce wasting time
5. Reuse for industrial cooling and for landscape and golf course irrigation
6. Water rationing

(Engineering Science, Inc., 1976d).

Items 1, 2 and 6 above could be implemented by a local water supply agency, while items 3 and 4 could be initiated by either water supply or wastewater management agencies. Item 5 would most appropriately be a wastewater management agency's responsibility.

Modifications to household plumbing are perhaps the easiest implemented, yet most effective means of reducing domestic wastewater flows. Existing facilities can be fitted with relatively inexpensive volume reduction devices (especially toilets and showers), while new developments can be required to use water-saving facilities simply by modifying building codes. County boards of supervisors and city councils have the authority to enact these water conservation and flow reduction measures. Tables 36 and 37 indicate the source of wastewater flows from a typical household and the flow reduction that could be achieved by using low water use household facilities.

The California-American Water Company, which supplies domestic water to the cities on the Monterey Peninsula, has already invoked voluntary water rationing and public education programs in the face of a severe short- and long-term water supply shortage. The water rationing program was discussed earlier in the Water Supply section of the Environmental Setting. To date, the program's success in reducing wastewater flows has not been determined. In addition, the Cities of Monterey and Pacific Grove have revised local ordinances to require use of low-flow water facilities in new dwelling units. The ordinances are aimed primarily at reducing water consumption, not wastewater production.

The possibility of reducing waste solids in the area's waste stream is also being investigated by the project engineers. Several methods of reducing the industrial load will be specifically investigated, including pre-treatment of wastes on-site, and hooking of more industrial discharges to the separate industrial treatment system in the Salinas area. Some of the benefits of reducing waste solids concentrations

Table 36*

HOUSEHOLD WATER USE WHICH RESULTS IN WASTEWATER FLOWS (family of four)

Use Function	Gallons Per Day	Percent of Total Use
Toilet flush	115	39
Bathing	92	31
Laundry	41	14
Kitchen	33	11
Lavatory	9	3
Utility sink	6	2
Total	296 (74 gpcpd)	100

Table 37*

ESTIMATED PER CAPITA DOMESTIC WASTEWATER GENERATION AND OPTIMUM EFFECTIVENESS OF FLOW REDUCTION MEASURES IN NEW DEVELOPMENT

Water Use	Estimated Present Wastewater Generation (gpcpd)	Percent Reduction Possible[1]	Wastewater Flow Reduction (gpcpd)
Toilet	29	50[2]	15
Tub bath or shower	23	60[3]	14
Dishwashing	6	--	--
Laundry	10	20[3]	2
Garbage disposal	2	--	--
Cooking, cleaning	4	—	--
Total	74	40(avg)	~31 (gal)

[1] Estimated reduction presently feasible in new development is estimated to be 30 percent resulting in a 22 gpcpd savings.

[2] Environmental Protection Agency, 1974, Demonstration of Waste Flow Reduction from Households.

[3] Baker, L. K., May 1975, "Household Water Conservation Effects on Water Energy and Wastewater Management."

* Source: U. S. Environmental Protection Agency, pers. comm.

are improved water treatment; reduction in solids handling, treatment and disposal facilities requirements; and an energy savings. The solids load in municipal wastewater may be more difficult to reduce. One of the biggest contributors is the home garbage disposal. A customer education program initiated by the local water supply or wastewater management agency could encourage less use of disposals and a greater reliance on the garbage collection service. Initiation of organic waste composting as an alternative to using the home garbage disposal system should also be encouraged. Composting has the added benefit of supplying an inexpensive, highly effective soil amendment. Elimination of storm drain attachments to the municipal sewer system would also reduce the amount of solids reaching the treatment plant. Periodic checks of storm drains, building down spouts and manhole covers by the wastewater management agency staff can lower the number of illegal or authorized connections to the sewer system.

IMPACT ANALYSIS OF ALTERNATIVE PROJECTS

Introduction

This section of the EIS identifies and discusses the environmental, social and economic impacts of six alternative plans (including no action) for the collection, treatment and disposal (or reuse) of north Monterey County wastewater. The impacts discussed include not only the primary (or direct) effects -- the immediate results of an action -- but also the secondary (or indirect) effects -- the consequences of the direct effects. The time frame of the impact (short or *long term*), its nature, general magnitude and associated indirect effects are described wherever possible. In some cases the analysis refrains from labeling effects as either beneficial or adverse, since these designations often depend on the value system of the person evaluating the impact. Measures which could mitigate (reduce in magnitude) or avoid the adverse aspects of an impact are also identified, where applicable.

The section is organized into several sub-sections to minimize repetition and at the same time facilitate a comparison of the alternatives. The first sub-section deals with short and long-term effects of construction of the project facilities, including interceptors, treatment plant, storage reservoirs and ocean outfall. The short-term impacts are common to most of the alternatives, are relatively insignificant in relation to the total effect of the project, and are usually capable of effective mitigation. They are summarized in Table 38. Those short and long-term construction impacts specific to certain alternatives are discussed separately.

The second sub-section deals with the operational aspects of the alternatives, including wastewater collection, treatment and disposal/reuse. Here, impacts are organized under the various elements of the environment described in the Environmental Setting; i.e., surface water, groundwater, soils, land use, wildlife, etc. In this way, the relative impact of each alternative on a given segment of the environment can be readily compared.

The final two major sub-sections deal with the economic and no action alternative impacts. These are followed by separate chapters on secondary growth impacts, a summary analysis of alternatives, and summary impact discussions required by the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

Impacts from Construction of Project Facilities

Impacts Common to All Project Alternatives

Construction impacts are for the most part short term and capable of being effectively mitigated. Short term in this case refers to the period from initiation of the plan to shortly after the end of construction. Some of the alternatives involve phased construction, but the short term impacts relate mainly to the periods when facilities are being actively constructed, not the intervening periods. The construction impacts common to all of the alternatives (except "no action") and recommended mitigation measures are given in Table 38. This includes impacts from construction of the interceptors and treatment plant.

Impacts requiring additional discussion are presented below.

Wildlife Disturbance. The activities of construction -- human activity, heavy construction movements (subsurface vibration), noise, etc. -- will disturb resident animals causing them to temporarily move out of the construction area. If the adjacent area into which the animals move is already at its carrying capacity for that species, the population of the species would be reduced. For each species displaced, the adjacent population of that species will be affected. The areas of primary concern along the proposed interceptors are the Salinas River riparian habitat and the open grassland on the Armstrong Ranch. The disturbance can be kept to a minimum simply by confining construction activity to the smallest area possible and locating corporation areas and temporary roads away from riparian areas.

Loss of Wildlife Habitat. Loss of habitat results from removal of vegetation and covering of open lands. Clearing and excavation for interceptor and treatment plant construction will destroy some grassland habitat and possibly some riparian vegetation along the Salinas River and Tembladero Slough. The losses, although small, will displace animals as described above. Mitigation measures are described in Table 38.

Table 38

CONSTRUCTION IMPACTS[1]

	Interceptor Routes															Treatment Plant Sites						
Impact	A1	A2	B1	B2	C1-C2	D1	D2	D3	E1	E2	E3	E4	E5	F1	F2	1	2	3	4	5	6	Recommended Mitigations
ADVERSE																						
Traffic disruption	IS*	SS	MS	MS	IS	MS	MS	SS	SS	MS	IS	SS	IS	SS	MS							• Reroute traffic around construction areas. • Provide flagmen in areas where rerouting is not possible.
Creation of noise and dust at construction site	IS	IS	IS	IS	MS	MS	MS	MS	MS	IS	IS	MS	IS	IS	IS	MS	IS	IS	IS	IS	IS	• Keep soil watered down in construction areas. • Require internal combustion engines to have mufflers, baffles. • Perform construction work during normal daylight and working hours.
Increase in emission of aerial pollutants by construction equipment	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	IS	• All internal combustion engine equipment should be equipped with emission control devices.
Visual disruption at construction site	MS	MS	MS	MS	IS	MS	MS	MS	MS	MS	MS	MS	MS	MS	MS	MS	MS	MS	IS	IS	MS	• Store construction equipment in areas that would not create visual eyesores and minimize impact on vegetation. • Fence or otherwise screen construction maintenance areas. • Avoid extended stockpiling of excavation spoil. • Reseed grassland areas denuded by construction.
Creation of safety hazard at construction site	MS	MS	IS	IS	MS	MS	MS	MS	MS	IS	IS	MS	IS	IS	IS	IS	IS	IS	IS	IS	IS	• Maintain equipment in an enclosed corporation yard. • Keep curious bystanders away from construction areas. • During trenching operations, leave no open trenches for longer than one working day.
Wildlife disturbance[2]	IS	IS	IS	IS	IS	IS	IS	IS	IS	MS	MS	IS	MS	IS	IS	MS	IS	IS	MS	MS	IS	• Avoid removal and/or damage of vegetation wherever possible.
Loss of wildlife habitat[2]	IL	IL	ML	ML	IL	IL	ML	IL	IL	ML	ML	IL	IL	IL	IL	ML	ML	IL	ML	ML	IL	• Confine soil and vegetation removal to the smallest area possible. • Locate spoil disposal sites in areas that would minimize vegetation damage. • Reseed disturbed surfaces and permanent spoil piles with native plants.
Surface water degradation[2]									IS	IS	MS	IS	MS	IS	IS							• Disturb minimum soil area possible. • Stockpile spoil away from areas that drain to major surface waters.
Possible loss of rare and endangered plants[2]	SL	SL		SL	SL																	• If construction activity extends off of road surfaces, conduct detailed field survey of plants in areas to be disturbed.
Loss of agricultural land									IS	IS	MS	IS	MS	MS	IS	ML	IL	SL	ML	ML	SL	• Utilize minimum space possible for permanent facilities. • Avoid construction on prime agricultural land.
Commercial activity disturbance[2]	IS	SS				MS	IS	MS	SS	IS	MS	SS	MS			IL		ML	IL	IL	ML	• Maintain access routes to commercial establishments along construction zones. • Keep noise and dust to a minimum as described above.
Residential area disturbance[2]	MS	MS	MS	MS	MS		MS		MS	IS	IS	MS	IS			MS				IS	IS	• Keep Noise and dust to a minimum as described above. • Maintain access routes to all residences along the construction route.
Loss of archeological resources[3]																						
BENEFICIAL																						
Temporary increase in local and regional economic activity.[3]																						• None
Temporary increase in employment[3]																						• None

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[1] See Figure 30 for pipeline routes and treatment plant sites.
[2] Discussed in text.
[3] Common to all construction alternatives.

* Impact Duration and Magnitude - magnitude terminology (i.e., Insignificant, moderate, severe) is provided to reflect differences in alternatives and does not necessarily reflect the overall impact on the environment.

IL	Insignificant long term	IS	Insignificant short term
ML	Moderate long term	MS	Moderate short term
SL	Severe long term	SS	Severe short term

Surface Water Degradation. Excavation of farmland, vegetated areas or stream bottom in or adjacent to the Salinas River, Tembladero Slough or Alisal Slough could create temporary turbidity and sedimentation impacts in these water bodies. The likelihood is increased if construction occurs during the rainy season or if revegetation is not properly initiated. Interceptors from Salinas and Castroville have the greatest possibility of creating temporary turbidity problems. The best way to avoid the impact is to hang the interceptors on existing bridges rather than dredge and bury them in stream bottoms. Disturbed areas adjacent to the streams should be replanted with native plants. This could become a significant long-term impact if the revegetation is not accomplished.

Commercial Activity Disturbance. Interceptor-related trenching in roads can temporarily block access to roadside businesses and create noise and dust conditions that may discourage potential customers. Also, construction through croplands can temporarily disrupt normal agricultural operations by blocking access, interrupting irrigation, cultivating or harvesting, and removing land from cultivation. These problems are all short term and can be reduced in severity by maintaining some form of access to adjacent commercial areas and minimizing noise and dust. It would also be helpful to schedule construction through cropland when agricultural activity is at a low point.

Residential Area Disturbance. Construction impacts on residential areas are similar to those on commercial areas. Temporary blockage of access and creation of noise and dust are the major problems. These can be minimized by following standard construction practices such as watering for dust suppression, limiting activity to daylight hours and maintaining alternate accesses to adjacent property.

Archeological Impacts. With one exception, there was no surface evidence of pre-historic sites within alternative treatment plant sites, interceptor alternatives or outfall routes. One probable pre-historic site (JS-MP-1) was located in the vicinity of the Seaside Treatment Plant. It is not within the proposed interceptor route (Alignment A1) that passes the Seaside plant, but it is close enough to deserve mention.

The area of the site covers about 30 meters by 30 meters and is located on the western slopes of a small sand dune. Evidence of prehistoric habitation is sparse but there is sufficient content to consider it as a site.

Cultural material includes chert flakes, retouched flake scrapers, an obsidian flake, thermal fractured rock (broken cooking stone), shell fragments, and mammal bone fragments.

The presence of site JS-MP-1 is probably related to the available water source contained by the fresh water lagoons immediately south of the site location. Other sites may be present, but the unstable sand dunes of the survey area have perhaps concealed any surface evidence of prehistoric occupation.

The lack of sites in areas adjacent to the Salinas River on the secondary terraces cannot be explained. It may be that these areas were subject to periodic overflow of the river and were considered untenable by the Indian population.

Although not on the interceptor alignment, the area of JS-MP-1 should have further testing to allow an evaluation of significance of the site if the pipeline route is moved seaward of the proposed alignment. It is strongly recommended that a minimum of three 1 x 2 meter units would need to be excavated by a professional archeological firm. The analysis of recovered data would permit an evaluation of the site and allow the archeologist to develop specific recommendations concerning further disposition of the site.

Although no sites were identified in other areas of the project, much of the land is covered by active or older, stabilized sand dunes. The dunes may have buried other archeological sites, leaving no surface evidence of their location. It is recommended that construction be halted and a qualified archeologist be consulted for advice should unusual amounts of shell, bone, stone, or artifacts be uncovered during construction activities (see Appendix F for full archeological report).

Energy Consumed in Project Construction. Concern for dwindling energy supplies in the state and nation and the environmental consequences of utilizing the different energy sources has led to a more detailed analysis of project energy consumption in EISs. This includes energy consumed in construction. Quantitative analysis is extremely difficult because detailed facilities design has not yet been initiated. This impact discussion is therefore general in nature.

The energy consumed in constructing the interceptor system would be the same for all project alternatives with the exception of "no action", which would require no new interceptors. The major energy consumers would be pipe delivery vehicles and excavation vehicles. The excavation consumption could best be kept to a minimum by choosing the most direct pipeline routes and the most central regional treatment plant site, and by placing the pipeline on the surface or at the shallowest depth possible. In the past, construction energy consumption has not played a major role in locating facilities; other environmental and economic considerations are likely to be the major factors in selecting pipeline routes and treatment plant site. Fuel consumed by pipe delivery vehicles (or vehicles transporting any construction materials) could be minimized by procuring materials locally whenever possible.

There is also an indeterminable amount of energy consumed in the mining and manufacture of materials used in construction. Aggregate, lumber, steel and clay products all require energy in their production. Use of locally abundant natural materials (clay, aggregate) that require minimal alteration should be encouraged to keep the energy costs of construction to a minimum.

Construction of treatment plants, storage reservoirs and disposal/reuse facilities will require a variety of energy-consuming equipment. Land leveling and grading, transport of construction materials and excavation for pipelines will all utilize gas and diesel-powered vehicles. Energy consumed in construction of the plant itself would be quite similar for the five alternatives. The alternatives with tertiary treatment facilities require slightly more land area and therefore more land leveling. This is insignificant in relation to the total construction energy input, however. Selection of the treatment plant site with the smallest grading requirement is probably the best energy conservation technique available for treatment plant construction.

Storage and disposal facility construction are the major differences between alternatives. Alternatives 170 and 171 would require grading of large areas for storage or percolation/infiltration ponds (900- and 185-acre facilities respectively). Alternative 134 would require construction of a 100-acre storage facility. Alternative 166 would also require a small storage pond. The amount of grading required for each of these depends upon the location chosen and the specific design.

The ocean outfalls of Alternatives 1 and 166 would require use of barges and other sea-going equipment. A large amount of rock and/or sand would be transported to the outfall location or excavated on site to form a berm over the pipe. The irrigation delivery pipelines of Alternatives 170 and 171 would require considerably less energy to construct, as would the river outfall of Alternative 134.

The exact amount of energy consumed in the above-mentioned construction activities cannot be accurately estimated. Table J-11, however, lists the rate of fuel consumption of construction equipment typically used in these activities.

Consumption is best reduced by reducing the amount of construction. Other conservation techniques are also possible, however. Use of the most energy-efficient vehicles and machinery should be encouraged. All motors should be properly tuned and serviced to insure maximum efficiency. Where possible local construction materials should be used. Construction personnel should be locally housed to minimize daily commutes. Worker car pools can be encouraged.

Impacts on Rare and Endangered Wildlife Species. One amphibian and seven avian species considered as rare or endangered are known to or believed to occur within the study area. Two species, the American peregrine falcon and southern bald eagle, occur statewide, with the Monterey area representing a portion of their ranges, while two other species, the California brown pelican and California least tern, occur along the coastline of the study area during the spring, summer and fall.

Known or possible resident rare and endangered species are the California black rail, California clapper rail, and the yellow-billed cuckoo.

Construction and operation of the treatment plant and interceptor systems should not impact any of the bird species mentioned above. The Santa Cruz long-toed salamander is known to inhabit vernal pond areas outside of the study area to the north of Elkhorn Slough. Recent ground and aerial surveys by the California Department of Fish and Game identified nine possible other sites (adjacent to and within the study area); however, no populations have been confirmed (Vestal, pers. comm.). Construction through seasonal or permanent freshwater ponds or surrounding vegetation in dune areas between Monterey and the Salinas River should be conducted only after the California Department of Fish and Game has been consulted in regard to the possible presence of this salamander.

The Smith's blue, which depends on sand dune vegetation for its habitat, could be affected by construction through dunes between Monterey and the Salinas River. Construction along the frontage roads in Seaside, Ft. Ord and Marina should be kept within the existing road bed or immediate shoulder wherever possible, to avoid removal of vegetation important to the Smith's blue's continued existence. Temporary spoil placement and movement of construction vehicles should also avoid dune areas if possible.

Impacts on Rare and Endangered Plant Species. The known locations of plants identified as rare or endangered by the California Native Plant Society were plotted in relation to proposed interceptor systems and treatment plant locations.

Based on this evaluation, it is unlikely that any of the project features will impact known populations of rare or endangered plants. The possibility does exist however, that interceptor or outfall pipelines could impact plants not previously mapped by the California Native Plant Society. The most likely sensitive locations would be in the coastal sand dunes habitat between Monterey and Marina. These areas not only have the potential for containing rare or endangered plants, they include recognized, unique natural areas.

Impacts Specific to Certain Alternatives

Although all of the alternatives include basically similar wastewater collection and treatment systems, there are several different methods of disposal or reuse that are being investigated, and these require construction of slightly different facilities. Alternatives 1 and 166 will require construction of an ocean outfall; Alternatives 134, 166, 170 and 171 will require a delivery pipeline to an irrigation area in the vicinity of Castroville; Alternative 134 will include a small surface storage area and an outfall to the lower Salinas River; and Alternatives 170 and 171 need large land areas for either surface storage (#170) or percolation/infiltration ponds (#171). The impacts of constructing these facilities are described briefly below.

Ocean Outfall. As stated above, Alternatives 1 and 166 require ocean outfalls. The four possible outfall routes being analyzed are shown in Figure 32. For purposes of the analysis, it has been assumed that the treatment plant will occupy Site 4. If another plant site is used, the outfall route will require some adjustment. Impacts likely to result from construction of the land-based portions of the outfalls are presented in Table 39. The seaward route of the outfall has not yet been specifically identified.

Wastewater Delivery Line to an Irrigation Area. All four of the alternatives that include wastewater reclamation will require construction of a pipeline to an irrigation area (Alternatives 134, 166, 170, 171). This line has not been specifically located yet, but is expected to run easterly from the treatment plant, across the Salinas River to the Salinas Valley floor.

The construction impacts of this line are dependent on the location of the treatment plant and the specific route followed, but should be quite similar to those of the interceptors from Salinas to the regional plant (Alignments E1 to E5 in Table 38). One important exception is construction across the Salinas

Table 39

INTERCEPTOR CONSTRUCTION IMPACTS - LAND PORTION OF OCEAN OUTFALL

Alternatives 1 and 166

	Outfall Alternative[1]				
Impact	1	2	3	4	Recommended Mitigations
ADVERSE					
Wildlife disturbance	MS	MS	IS	IS	● Avoid removal and/or damage of vegetation wherever possible. ● Plan construction to avoid periods of high transient wildlife populations; nesting and brood-rearing seasonal fall through spring.
Wildlife loss	ML	IL	IL	IL	● Confine construction activity to established rights-of-way whenever possible. ● Confine construction equipment and activity to smallest area possible.
Loss of habitat	MS	IS	IS	IS	● Confine soil and vegetation removal to smallest area possible. ● Locate spoil disposal sites in areas minimizing vegetation damage. ● Reseed disturbed areas and permanent spoil piles. ● Confine construction to existing rights-of-way wherever possible.
Water quality degradation (sedimentation)	MS	IS	IS	IS	● Disturb minimum soil area possible. ● Avoid cutting banks of surface waterways. ● Stockpile spoil away from areas that drain directly to surface waterways. ● Regrade and reseed disturbed surface areas.
Stimulus to dune erosion	MS	SS			● Jack and bore pipeline under dunes if possible. ● If surface cut made, confine to smallest width possible, and regrade and reseed when construction complete.
Loss of agricultural land	MS	MS		SS	● Confine construction activity to existing rights-of-way wherever possible. ● Stockpile and replace excavated topsoil. ● Locate equipment corporation maintenance yards on other than agricultural land.
Residential area disturbance	MS	MS			● Keep noise and dust to a minimum as suggested below. ● Maintain access routes to residences along construction zone.
Commercial activity disturbance[2]	MS	MS	MS	MS	● Follow mitigations suggested for loss of agricultural land. ● Schedule construction to coincide with periods of low agricultural activity. ● Maintain access routes to all commercial zones.
Aesthetic disruption	MS	MS	IS	MS	● Store construction equipment in areas that will not create visual eyesores. ● Fence or screen construction maintenance areas. ● Regrade and reseed areas where vegetation has been removed.

	Outfall Alternative				
Impact	1	2	3	4	Recommended Mitigations
Traffic disruption	MS	IS	IS	IS	● Reroute traffic around construction areas. ● Provide flagmen in areas where rerouting is not possible.
Creation of noise and dust at construction site	IS	IS	IS	IS	● Keep soil watered down in construction area. ● Require sound baffles or mufflers on all internal combustion engines. ● Perform construction during normal daylight and working hours.
Increase in emission of aerial pollutants by construction equipment	IS	IS	IS	IS	● All internal combustion engine equipment should be equipped with emission control devices.
Loss of archeological resources[3]					
BENEFICIAL					
Temporary increase in local and regional economic activity[4]					● None
Temporary increase in employment[4]					● None

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[1] Impact Duration and Magnitude - magnitude terminology (i.e., insignificant, moderate, severe) is provided to reflect differences in alternatives and does not necessarily reflect the overall impact on the environment.

IL	Insignificant long term
ML	Moderate long term
SL	Severe long term
IS	Insignificant short term
MS	Moderate short term
SS	Severe short term

[2] Includes agricultural operation.

[3] Discussed in text.

[4] Common to all construction alternatives.

River. There is no existing right-of-way crossing the river in the probable construction area; therefore, it will be necessary to remove riparian vegetation and trench through the active river bed. This may result in the loss of valuable wildlife habitat and create a short-term sedimentation problem in a small section of the river. The removal of vegetation and presence of construction equipment would also create an adverse short-term visual impact.

These potential impacts could be mitigated by locating the crossing in an area of sparse vegetation. If the construction is performed in the river's low flow season and disturbed stream banks are regraded and revegetated, the sedimentation problem can be kept to a minimum. Revegetation would also mitigate, at least in part, the loss of wildlife habitat.

Salinas River Outfall. The outfall to the Salinas River would be required in Alternative 134. Its alignment has not yet been identified but it would possibly follow the general route proposed for the pipeline to an irrigation area on the Salinas Valley floor (see Figure 34). The construction impacts would be basically the same as those described above for the irrigation delivery line. The short-term sedimentation problem would be less severe, however, as the bank of the river would be cut on only one side.

The short-term sedimentation impact could be kept to a minimum by placing the pipe on the surface where it enters the river, but this could create a long-term adverse aesthetic impact. This does not appear to be a worthwhile environmental trade-off. More appropriate mitigation would be to keep the extent of the bank cutting to a minimum and schedule this activity in the dry season to avoid erosion by runoff.

Surface Storage-Percolation/Infiltration Ponds. Alternatives 134, 166 and 170 require construction of surface storage areas, and Alternative 171 includes construction of infiltration/percolation ponds. These facilities have basically the same types of impacts and will therefore be discussed simultaneously.

None of the pond areas has been specifically located, but it is assumed that the duneland south of the Salinas River and east of State Highway 1 would be used. The heavy construction equipment used to build the necessary embankments and dams would create the same short-term noise, dust, aesthetic and air emissions impacts listed in Table 38. Similar mitigation should be employed. The grassland and its use for livestock grazing would be eliminated in favor of the new use.

For Alternative 166, this loss would be relatively small, around 4 or 5 acres. In Alternative 134, approximately 100 acres of grassland would be lost; in Alternative 170 the loss would be 900 acres and in Alternative 171 it would be approximately 185 acres. The wildlife utilizing or living on this land would be displaced or lost, depending upon their mobility. Future use by terrestrial species would also be eliminated. Several rodent species, jackrabbits, and numerous songbirds and raptors are most likely to be affected.

There is no effective mitigation for this loss of habitat and wildlife other than confining the new facilities to the smallest area possible. Relocation of the facilities would change the location of the impact, but would probably not change its magnitude, as other lands available for use as storage sites have similar vegetative cover. Purchase of property similar to that lost, to be held permanently as habitat, could compensate for the loss to some extent, but would not actually mitigate the loss. Purchase and protection of a large buffer strip around ponds would provide some of this compensation.

Removal of vegetation and disturbance of the soil would increase soil erosion. Wind rather than overland runoff from rainfall would probably be the major erosive force. The sandy soils and rapid percolation rate reduce the effects of overland flow. Heavy equipment should be confined to construction and storage areas to reduce soil and vegetation damage and stockpiled soil material should be wetted during windy periods. Once construction is complete, the disturbed areas should be reseeded with appropriate fast-growing grasses, that are native to the area.

A soil sealer will have to be applied to the interior of the surface storage reservoirs in Alternatives 134 and 170. This material, probably a clay or plastic liner, will be irretrievably committed to the project. The exact amount needed is not known, but it will be substantial for the 900-acre storage reservoir that is part of Alternative 170.

Impacts from Operation of the Project Facilities

The operational impacts discussed below would result from the collection, treatment and disposal or reuse of the study area's domestic wastewater. Both the primary and secondary effects (excluding those related specifically to subsequent population or economic growth) of operation are considered. Impacts on the various segments of the existing environment are discussed separately and each of the five principal project alternatives is given consideration. A summary matrix of operational impacts is included at the end of the section.

Most of the operational impacts are long term in that they will be in effect for the life of the project or longer. These impacts tend to be on or near the facilities site or pipeline route or at the point of discharge. Construction of facilities on one site often tends to encourage use of that location for similar activities for a long time to come. Some impacts are common to all of the alternatives, while others may be specific to a single alternative. Those common to all alternatives will not greatly affect the selection of a recommended plan even though they may be significantly adverse.

Impacts on Water Quality

Groundwater Quality

Reduced Sea Water Intrusion into the Salinas River Groundwater Basin. Alternatives 134 and 166 would deliver reclaimed wastewater to the lower Salinas Valley for crop irrigation during the main irrigation season. In contrast, Alternatives 170 and 171 would deliver the entire annual production of the proposed regional plant's wastewater to the lower valley for irrigation (although delivery would be necessarily restricted to the irrigation season). By substituting wastewater for groundwater being pumped from the 180- and 400-foot aquifers in the Castroville area, the present inland movement of sea water in these aquifers would be retarded. The groundwater trough gradient created by agricultural pumping would gradually decrease as pumping decreased and the encroachment of sea water would lessen.

Alternatives 170 and 171 would have the greatest beneficial effect on the intrusion problem, as they could replace the largest amount of groundwater pumping. Each could deliver approximately 28,500 acre-feet of reclaimed water for irrigation by 1990 (based on projected wastewater flow rate of 25.41 mgd; Engineering Science, Inc., 1976a). Alternatives 134 and 166 would have a lesser, but still beneficial effect. They could supply approximately 16,900 acre-feet of reclaimed water by 1990 assuming a seven-month irrigation season. Alternative 1 would have no beneficial impact on the intrusion problem.

There is no estimate of the present groundwater overdraft available in the pressure area, but in 1955 it was estimated to be 20,000 acre-feet. It is undoubtedly much greater than that now. The reclaimed water supply available through any of the alternatives is therefore probably not sufficient to eliminate the entire overdraft. Some intrusion will continue along the coast, but TDS levels in the 180- and 400-foot aquifers in the vicinity of Castroville should decrease as the cone of depression is reduced. The reduction in TDS would be the most significant change in groundwater quality created by this switch in irrigation water supply.

Addition of Wastewater Constituents to the Groundwater. Alternative 1 would not affect groundwater quality in the study area (excluding possible effects of sludge disposal). The wastewater irrigation alternatives (134, 166, 170 and 171) will influence the water quality of the surface aquifer in the lower Salinas Valley, as part of the irrigated wastewater will percolate through the soil to the underlying aquifer. This thin aquifer is generally less than 50 feet below the surface and is perched above an impervious clay layer (the Salinas aquiclude) throughout most of the lower valley. There may be connections between this and the 180-foot aquifer, but the extent of groundwater interchange between these aquifers is unknown.

The primary elements of concern in the wastewater are nitrogen, salts, biological pathogens, and potentially toxic chemicals. The level IV treatment to be used for wastewaters that would be irrigated on crops would reduce total nitrogen to 30 mg/l or less. An additional decrement would be removed by plant uptake; this could be up to 90 percent of the nitrogen remaining in the soil moisture, depending upon the type of plant irrigated (Pound and Crites, 1973). Plants have varying capacities to take up and utilize nitrogen that is in solution in the soil. The actual amount reaching the groundwater table would be measured in the proposed agricultural demonstration project, but it should not exceed existing conditions, as the nitrogen in the wastewater would simply be replacing nitrogen normally applied to the soils as fertilizer. Artichokes currently receive approximately 200-300 pounds of nitrogen per acre per crop, and lettuce receives 150-250 pounds per acre per crop (Metcalf & Eddy, 1975). Project Alternatives 170 and 171 should convey approximately twice as much nitrate nitrogen to the irrigation area as Alternatives 134 and 166. Although leachate from the irrigation area should not reach a usable groundwater source, the U. S. Environmental Protection Agency drinking water standard for nitrate nitrogen is 10 mg/l as N or 45 mg/l as NO_3 (U. S. Environmental Protection Agency, 1975).

The TDS load of wastewater from the regional plant is expected to be between 725-750 mg/l. In some parts of the proposed irrigation areas, this would be lower than the TDS levels of existing groundwater supplies. In other areas, it would be significantly higher than existing supplies. Therefore, the effect on groundwater would vary considerably. In those areas currently irrigating with water of less than 700 mg/l TDS, the groundwater condition could be adversely affected. In areas where irrigation water has more than 800 mg/l TDS, the groundwater condition may improve. At present, the quality of the surface aquifer is such that few domestic or agricultural wells still draw from this source. Higher quality water is being drawn from the 180- and 400-foot aquifers. The proposed Castroville Irrigation Project would supply the lower Salinas Valley with a higher quality irrigation water. TDS estimates for the CIP range from as low as 240 mg/l (Leonard, pers. comm.) to about 400 mg/l (U. S. Bureau of Reclamation, 1974). Mixing of the treated wastewater with CIP water would reduce the TDS levels of the irrigation water.

Heavy metals and potentially toxic chemical compounds (pesticides, PCBs, etc.) are expected to occur in relatively low levels in the wastewater. Most should be filtered out by the soil column (see soil impacts for more detail). Some stable organic compounds of unknown composition may reach groundwater, however. The long-term effect of many of these compounds on public health has not yet been adequately documented; the agricultural demonstration project should closely monitor the movement of trace elements and stable organics into the groundwater.

The effect of wastewater irrigation on the quality of the deeper 180- and 400-foot aquifers should be negligible or nonexistent due to the relative depth of these aquifers and the presence of the clay aquiclude in the lower valley.

The likelihood of Alternatives 134 and 166 affecting groundwater quality in the surface aquifer is less than Alternatives 170 and 171 because they would supply less wastewater for irrigation use.

Alternative 171 poses an additional threat to groundwater quality in that it includes percolation of wastewater to underground storage in the dunelands north of Marina. Metcalf & Eddy (1975) indicate that an apparently continuous aquiclude exists between the dune sands and the 180-foot aquifer in the vicinity of the proposed infiltration-percolation ponds. However, further detailed geohydrologic study would be needed to ensure that wastewater stored in the dune sands would not infiltrate this aquifer. There may also be wells still drawing water from the upper aquifer to be used as a storage reservoir. Wells drawing from this aquifer could be seriously contaminated by wastewater.

The potential impact on the surface aquifer in the Castroville area could be lessened in several ways. Thorough mixing of the reclaimed wastewater with CIP or well water prior to irrigation would reduce the concentration of pollutants in the soil percolate. A well-managed irrigation program could also reduce the volume of water percolating to the groundwater.

If rates of applying irrigation water are regulated to closely match plant uptake and evapotranspiration, percolation through the soil is minimized. Periods between irrigation applications can also be designed to allow full drying of the soil. This reduces the possibility of overwatering and passage of applied water to the groundwater reservoir. Installation of tile drains to catch subsurface flow would also reduce the effect on the groundwater.

Additional treatment of wastewater prior to delivery for irrigation could also reduce impacts on groundwater supplies. Denitrification and desalinization would reduce the levels of pollutants in the wastewater, but the cost of this additional treatment would undoubtedly far outweigh benefits of such treatment.

The agricultural demonstration project being proposed as part of each of the four wastewater irrigation alternatives should aid in determining the actual effect on groundwater. The program includes monitoring changes in groundwater quality at the irrigation sites. This monitoring should continue if a full-scale irrigation project is implemented.

The possibility of groundwater contamination through subsurface storage (Alternative 171) could be eliminated by opting for surface storage instead (Alternative 170). However, this can create other environmental problems. Before subsurface storage is initiated, a thorough investigation of the underlying geologic conditions should be conducted. If subsurface storage is initiated, a groundwater monitoring program should be required to detect quality changes in adjoining groundwaters.

All of the alternatives could lead to contamination of groundwater at the Marina landfill site if landfilling is utilized as the method of sludge disposal. Estimated sludge volumes are discussed in a following section. The Marina site is a Class II landfill and therefore meets the physical and operational requirements stated in the California Administrative Code for sewage sludge disposal. Sludges with a high percentage of water are usually placed in an area with a leachate control system, however. If leachate controls are not properly maintained, some contamination of groundwater could occur. Heavy metal and biological contamination are of greatest threat to public health. The nearest wells are north and west of the Marina landfill. The chance of affecting wells to the north is extremely remote as pollutants would have to cross the east-to-west gradient of subsurface Salinas River flows. Wells downgradient (to the west) from the landfill would be more likely to be affected. There are at least two within a mile of the landfill's western border.

The possibility of affecting groundwater through landfilling of sludge could be effectively reduced or eliminated in several ways. The most obvious way would be to dispose of sludge in some other manner. Sludge incineration, land spreading and ocean disposal are discussed in the Alternative Projects section. If landfilling is utilized, additional dewatering would lower the groundwater contamination threat. This would require considerable energy and chemical resources, or use of large land areas or open sand drying beds, however. A more effective approach might be to establish a special sludge handling procedure at the landfill with emphasis on limiting percolation of sludge leachate. Discussions between the landfill operator and the appropriate regulatory agencies (RWQCB, State Solid Waste Management Board, County Environmental Health Department) should result in establishment of an appropriate leachate control and monitoring system. The RWQCB has also suggested a geologic study of the site be conducted to verify the continuity of the clay layer that underlies the site. This would indicate the likelihood of sludge leachate reaching the groundwater table.

Surface Water Quality.

Elimination of Domestic Wastewater Discharges to the Lower Salinas River. During low flow conditions (generally May through November), the water quality of the Salinas River below Spreckels is seriously impaired by wastewater discharges from the two Salinas treatment plants. Low dissolved oxygen, high BOD, high nitrates, periodic algae blooms and bacterial contamination are commonplace during the summer (see Tables 6 and E-1 for specific water quality measurements). The source of surface flows (and therefore the water quality problems) during low flow periods just below Salinas is almost exclusively wastewater discharges. Further downstream, agricultural return flows become a significant influence on both flow volume and quality.

All of the proposed alternatives would improve water quality conditions in the river from Spreckels downstream to the Blanco Drain, a stream distance of about 8 miles. Elimination of the Salinas wastewater discharges would decrease surface water nutrient loads, salt content and biological contaminants. It would also reduce flow volume by up to 90 percent in low flow periods. The remaining dry weather flows would be from nonpoint source discharges (i.e., agricultural runoff, groundwater inflow) and upstream reservoir releases that are not percolated to the groundwater table. The quality of these remaining flows might be superior to present conditions, but would still contain TDS, nutrient and bacterial loads in excess of levels recommended for many of the beneficial uses of the river.

Agricultural runoff from the Blanco Drain would continue to impair water quality in the lower river and lagoon. Its runoff typically contains high TDS (3,900-4,300 mg/l), high nitrates (10 mg/l) and moderate pesticide levels. Blanco Drain water is a combination of irrigation return flows and highly mineralized perched groundwater which seeps into the drain. The perched groundwater is a combination of direct rainfall and percolated agricultural runoff. The influx of this water would continue to encourage periodic algae blooms and dissolved oxygen sags in the lagoon.

The specific effect that eliminating the Salinas discharges would have on water quality in the lagoon is difficult to determine. Water quality data for the lagoon have not been collected on a regular basis in the past, and data that are available seldom include flow conditions at the time of sampling. Flows in the river below Spreckels are seldom measured. It seems likely that removing the wastewater would result in increased salinities at the river-lagoon interface during low flow periods, as the influence of ocean tidal influxes and Blanco Drain inflow would increase relative to the present situation. Nitrogen and bacterial loads reaching the lagoon should decrease, but not sufficiently to allow water contact recreation in the area. During normal high flow periods (December through April) the removal of wastewater would have little influence on lower river or lagoon water quality.

Alternative 134, which includes discharge of effluent from the regional treatment plant to the lower river or lagoon, would have a markedly different effect on lagoon water quality. This would be especially true during the low flow period. Initially the treatment plant would be discharging about 20 mgd (flows would vary about a mean of 31 cfs) of wastewater on a year-round basis. Depending upon the level of treatment (level V or level III), this effluent would have a BOD of between 5 and 10 mg/l, total nitrogen of 5 to 30 mg/l and total phosphorous of 0.5 to 6 mg/l. Suspended solids would be between 2 and 5 mg/l (Engineering Science, Inc., 1976b). The lower concentrations represent conditions superior to those existing in the lower river and lagoon, especially during low flow periods. The higher concentrations would probably be similar or slightly higher than existing conditions. The scarcity of data on the lagoon and its water sources, however, make it impossible to accurately estimate the effect the waste discharge would have on the lagoon over a period of time and a range of flow conditions. It is very likely that the level V discharge would have a pronounced beneficial effect on the lagoon by providing high quality flushing flows during normally low flow periods. It is unlikely that it would eliminate current algae problems; however, even level V effluent would have sufficient nutrients to support algae, especially during low flow periods when dilution is low. The level III effluent may have little effect during high flows in the river, but during low flows it would add plant nutrients (nitrogen and phosphorus) that would tend to perpetuate the periodic algae problems in the lagoon. It is likely that algae blooms would continue in the lagoon even in the absence of a wastewater discharge, as large amounts of nutrients are also being contributed by agricultural runoff.

It would be necessary to conduct an intensive water quality and flow monitoring program in the lagoon, the lower Salinas River, Blanco Drain, and the adjacent perched aquifer to accurately estimate the impact of eliminating or increasing waste flows to the lagoon. This is discussed further in the Significant Issues to be Resolved section.

Reduced Wastewater Flows to Tembladero Slough, Old Salinas River and Moss Landing Harbor-Elkhorn Slough. Removal of the Salinas and Castroville wastewater discharges would also beneficially affect water quality in Old Salinas River, Tembladero Slough and the Moss Landing Harbor-Elkhorn Slough area. All of these waters receive biological contaminants and nutrients from the existing discharges.

Old Salinas River and the Moss Landing Harbor-Elkhorn Slough area are affected by both the Salinas and Castroville wastewaters. In the summer, when the sand bar closes the Salinas River mouth, wastewater in the Salinas River can flow from the lagoon into the old river channel and thence into Moss Landing Harbor. This also occurs in the winter, but the quality of the Salinas River flow is much better due to increased dilution from natural surface runoff. The Castroville discharge enters Tembladero Slough, then the old river channel and the harbor. Elimination of the Castroville discharge would be of most benefit to Tembladero Slough, Old Salinas River and Moss Landing Harbor-Elkhorn Slough water quality. Removing the Salinas discharges should also have a beneficial but less significant effect on the old river channel and the Moss Landing Harbor area, especially in the summer months.

Periodic algae blooms and high bacterial counts would probably persist in these waters even after removal of the domestic waste discharges. Agricultural runoff, septic tank leakage and raw waste discharge from boats have been major contributors to the poor water conditions, especially in Moss Landing Harbor and Elkhorn Slough. Until these sources are eliminated, the water quality in Elkhorn Slough will not meet the State Water Resources Control Board criteria for the waterway's assigned beneficial uses. This includes water contact recreation and shellfish harvesting. The Moss Landing Harbor District has taken steps to eliminate waste discharge from boats and the recently-completed Moss Landing Facilities Plan is aimed at removing septic tank leakage problems. Agricultural runoff and other non-point sources of pollution are to be analyzed in the 208 planning effort being conducted by AMBAG.

Alternative 134, with its lower Salinas River wastewater discharge, would add waste flows to the Old Salinas River and Moss Landing Harbor-Elkhorn Slough, primarily in the summer. If level V treatment were being used, there should be no significant impact on water quality. If level III treatment is used, the added nutrient source could contribute to continued algae problems in the old river and Moss Landing Harbor, but only if nitrogen and/or phosphorous are limiting algae growth at present. Numerous point and nonpoint sources are contributing nitrogen and phosphorous compounds to these waters throughout the year, probably in sufficient quantity to support large algae populations even in the absence of domestic wastewater discharges.

Level V treatment would provide the greatest probability that the Alternative 134 wastewater discharge would not adversely affect water quality in the lagoon, but it is not known whether this level of treatment would improve lagoon water quality. It is possible this extra treatment could make the cost of Alternative 134 prohibitive without providing assurance that existing water quality problems will be improved or eliminated. Closing the tide gate between the old river channel and the lagoon in the summer would also eliminate most wastewater-related quality problems in the old river and Moss Landing Harbor, but this may create local flooding of farmlands along the Salinas River Lagoon.

Elimination or Relocation of Domestic Wastewater Discharges to Near-Shore Waters of Southern Monterey Bay. All of the proposed alternatives would eliminate the Monterey, Seaside, Ft. Ord and Marina ocean discharges. These discharges are currently contributing to periodic high nutrient levels in the Monterey Harbor-south bay coastline region. Sluggish circulation in the bay during the spring and summer months aggravates this high nutrient condition which has led to red tides in the past (red tides are large blooms of certain red-pigmented dinoflagellates [phytoplankton], occasionally occurring in such masses that they cause mortality in fish and other nekton as a result of toxins produced by the flagellates). High coliform bacteria counts along the beaches of the south bay indicate the present discharges also create an occasional health hazard.

Alternatives 1 and 166 would create a new wastewater discharge to central Monterey Bay, at least 6,400 feet (1,950 meters) offshore from the mouth of the Salinas River. Initially it would carry about 20 million gallons of freshwater daily to the bay bottom at a depth of at least 72 feet. By 1990 this flow would be 25 mgd. In order to meet SWRCB Ocean Plan specifications, the diffuser at the end of the pipe must be able to provide a 100:1 initial dilution 50 percent of the time and an 80:1 dilution 90 percent of the time. (Initial dilution refers to the ratio of wastewater to sea water in a given volume of the ocean at that point where the effluent plume ceases to rise in the water column.) Engineering Science, Inc. calculations indicate they can meet the 100:1 dilution requirement but not the 80:1 requirement at the proposed location of their outfall terminus. Table 40 provides a rough comparison of the trace metal constituents in the wastewater (prior to dilution) as opposed to those in the ocean. As can be seen, the undiluted discharge would contain significantly higher concentrations of the heavy metals, including iron, lead, copper, zinc, cadmium, chromium and manganese. The estimated wastewater concentrations of chromium, zinc and copper exceed current SWRCB Ocean Plan discharge standards (50 percent frequency standard). This may change, however, as Ocean Plan standards are being revised. The outfall would also establish a new source of nutrients to the bay waters. Total nitrogen is expected to be less than 45 mg/l and total phosphorus is expected to be less than 8 mg/l (Engineering Science, Inc., 1976d).

Considering the depth and distance offshore, this discharge should have little effect on the bay's nearshore water quality. More information on current patterns is being collected by Engineering Science, Inc. at the outfall site so that this impact can be better documented. New data will be incorporated into the EIS as it becomes available.

Alternatives 170 and 171 would benefit bay water quality most, as they completely eliminate wastewater discharges to southern Monterey Bay. Alternative 166 would discharge to the central bay only part of the year; primarily from November to March or April. Alternative 134 would indirectly discharge to the bay through the Salinas River lagoon from November to March or April. This lower river discharge could create increased nutrient, bacterial and trace element concentrations in nearshore bay waters south of the mouth of the river. The quality of the river discharge would be somewhat better than the proposed deepwater ocean discharges, however. Nitrate, phosphate and suspended solids concentrations and bacterial counts would be significantly lower. (See Table K-1; level 1A treatment is proposed for the ocean outfall; either level III or level V may be used for the lower river discharge.)

Table 40

CHEMICAL COMPARISON OF TRACE METALS IN SEA WATER AND PLANNED BAY WASTEWATER DISCHARGE

Average Sea Water Concentration[1] Element	mg/l	Wastewater Concentration[2] mg/l
B	4.5	0.57
N (NO_3)	15	12.9
Na	10,000	146
Mg	1,300	23.6
K	390	12.8
Ca	410	45.0
Cr	0.0005	<0.03*
Mn	0.002	0.21
Fe	0.003	0.80
Ni	0.007	<0.06
Cu	0.003	0.21*
Zn	0.01	0.35*
Cd	0.0001	<0.001
Pb	0.00003	0.06

[1] Goldberg et.al., 1971.

[2] Metcalf & Eddy, 1975.

* Exceeds current SWRCB Ocean Plan discharge standards.

Any adverse ocean water quality conditions produced by the Alternative 134 lower river discharge could be mitigated by using the higher level of wastewater treatment (level V). If the lower level of treatment is to be used, a water quality monitoring program should be initiated in the nearshore bay waters, primarily south of the river mouth.

Change in Character of Agricultural Return Flows. The four wastewater reclamation alternatives (134, 166, 170 and 171) would change the quality of water used for crop irrigation in the Castroville area. Instead of well water, treated wastewater or a combination of well water and treated wastewater would be used. If the Castroville Irrigation Project is built, the wastewater would be mixed with surface flows from the Salinas River prior to irrigation. The wastewater component would be greater (on an annual basis) for Alternatives 170 and 171 than it would for Alternatives 134 and 166.

The major changes in the irrigation water quality would include TDS, heavy metal concentration, and nutrient load. A direct comparison of ground and wastewater quality is difficult to make because the quality of the groundwater used in the Castroville area is extremely variable, but a brief summary of the two sources is presented below.

	Wastewater Supplied for Irrigation (mg/l)[1]	Groundwater in the Castroville Area (mg/l)[2]
TDS	725-750	270-2,750
Total N	30	<1 to 88 (NO_3 only)
Cd	<0.002	<0.002[3]
B	0.5-0.6	0.00-0.70
Cl	185-214	22-1,200

[1] Engineering Science, Inc., 1976d.
[2] California Department of Water Resources, 1973, 1974.
[3] Monterey County Flood Control and Water Conservation District, 1971.

The water flowing from irrigation areas to surface streams is primarily subsurface runoff that has been intercepted by either tile drains or drainage ditches. Very little irrigation water flows from the fields without percolating through the soil first. Use of the wastewater should increase the TDS content of irrigation return flows in some areas, but may reduce TDS in areas now irrigating with higher TDS groundwater. Nitrate and heavy metal concentrations in runoff may also increase slightly, but a large percentage of these components may be filtered out by the soil prior to reaching drainage ditches. Agricultural runoff currently carries a high nitrate and phosphate load from fertilizer applications. If the nitrogen component of the wastewater is used as a fertilizer source, manufactured fertilizer applications could be reduced and total nitrogen in runoff may actually decrease.

Irrigation runoff enters a number of surface waters in the Castroville area. Alisal, Tembladero and Moro Cojo Sloughs, Blanco Drain, Old Salinas River and the lower Salinas River all receive direct and indirect runoff. A change in return flow nutrient content would have the most pronounced effect on the quality of these waters. All experience algae problems at some time during the year. Elimination of direct wastewater discharges (Salinas and Castroville) should have a greater influence on the future quality of these surface waters than a slight increase or decrease in nitrogen and phosphorous in agricultural runoff. Once the point-source pollution is eliminated, however, the agricultural runoff will have a greater influence.

Changes in quality of runoff could be mitigated by avoiding use of wastewater for irrigation. This, however, does nothing to aid the water supply shortage in the area. Increased wastewater treatment could remove additional increments of nutrients, salts and heavy metals, but this would be at considerable expense. The agricultural demonstration project proposed for all reclamation alternatives should study the differences in quality of return flows created by use of effluent. If a problem is identified, it may be necessary to intercept irrigation runoff for reapplication or some form of treatment rather than allowing it to reach the area's surface waters. Thorough mixing of wastewater with Salinas River surface diversion or good quality groundwater could also reduce the potential adverse effects on surface water quality.

Possible Surface Water Contamination from Sludge Disposal at the Marina Landfill Site. Sludge produced by all of the five alternatives would be either partially or totally disposed of in the Marina landfill. If the primary-secondary sludge is dewatered, it would have a solids content of between 20 and 30 percent, and the initial volume would be about 114 tons per day.

The exact method of sludge disposal has not yet been determined; it may be deposited and covered in an isolated section of the landfill site or it may be spread over a large area for drying and then be plowed into the soil for subsequent use as covering material. If it is not dried beyond the 20 to

30 percent solids level prior to landfilling, it may eventually affect surface waters in the Salinas River immediately adjacent to the Marina landfill. A leachate recovery ditch presently intercepts surface and subsurface runoff from land upslope from the active landfill. Sludge placed upslope from the ditch could eventually contribute water to the leachate. It could also increase the heavy metal, organic and bacteriological components of the leachate. Presently this leachate is discharged to the lower Salinas River about 2 miles upstream from the Highway 1 bridge. The quality of the flow is to be monitored in the future as a condition of the Regional Water Quality Control Board discharge permit required for the site.

Any increase in the heavy metal or bacterial content of the landfill discharge would adversely affect the river's water quality, especially as it relates to recreational and wildlife uses. The river already has high coliform bacteria counts from direct discharge of wastewater upstream.

These problems could be avoided in a variety of ways. The most obvious would be use of a different sludge disposal method. The impacts of incineration and landspreading are discussed in the Alternative Projects section. They could also be reduced by additional sludge dewatering prior to landfilling. This could be accomplished at the treatment plant by forced-air drying or sand-bed dewatering, but these methods have other environmental and economic shortcomings. Forced air drying requires a large amount of energy and sand drying necessitates purchase or lease of large land areas. Using the sludge as a soil amendment or land spreading and tilling it into the soil on the landfill site prior to disposal may be the most effective means of avoiding water quality problems. These alternative sludge dewatering processes are also discussed in the Alternative Projects section. If thorough dewatering of the sludge proves undesirable for any reason, the leachate trapped in the landfill recovery ditch could be pumped to the treatment plant for treatment, thus avoiding discharge to the Salinas River. MPWPCA, the State Solid Waste Management Board, the Monterey County Environmental Health Department, the Regional Water Quality Control Board, and the landfill operator should jointly investigate a landfilling method that would effectively avoid surface or subsurface runoff and still be acceptable to all concerned.

Impact on Water Quantity

Increase in Local Groundwater Supplies. Alternative 1 would have no impact on local water supplies. The other alternatives could beneficially affect the current water supply shortage in north Monterey County by substituting reclaimed wastewater for groundwater being pumped for irrigation in the lower Salinas Valley. The benefit would be realized by freeing groundwater currently used in crop irrigation for some other use. There would not be a straight one-for-one benefit accrued by the groundwater basin, as some losses in reclaimed water would occur during delivery (i.e., evaporation, loss to the surface aquifer). The groundwater basins and surface water supplies for the lower Salinas Valley and the Monterey Peninsula are currently overtaxed; this has resulted in development constraints in some areas and sea water intrusion into coastal groundwater aquifers. Realization of the benefit is dependent upon a successful demonstration of the feasibility of irrigating fresh produce crops with wastewater in the Castroville area.

Alternatives 170 and 171 could supply 14,500 acre-feet of irrigation water to the lower Salinas Valley by 1982 and 28,500 acre-feet by 1990 (this excludes evaporative and percolation losses during storage). This would in effect increase local groundwater stores by a similar amount. Alternatives 134 and 166 could supply approximately 8,400 acre-feet of wastewater for irrigation in 1982 and 16,900 by 1990 (assuming 7-month irrigation season), thereby benefiting the local water supply situation to a lesser degree. The actual amount of wastewater eventually supplied for irrigation might be somewhat less than these figures, as the demand for water will fluctuate from year to year. The proposed Castroville Irrigation Project has an anticipated total water demand of 18,000 acre-feet (April through October irrigation season). This added water supply is considerably less than the overdraft on the Salinas Valley pressure aquifers. Estimates of the current overdraft are not available, but in 1955 it was estimated to be 20,000 acre-feet, with a safe yield in the area of 78,000 acre-feet (Yoder-Trotter-Orlob & Associates, 1973). Groundwater pumping has increased since 1955.

Use of reclaimed wastewater in the Castroville Irrigation District could reduce or eliminate the need for Castroville Irrigation Project water, depending on which wastewater project alternative is selected. The Salinas River surface flow that would have been allowed to pass downstream to a diversion point near Salinas as part of the CID project could be used instead to further augment the Salinas River groundwater basin through percolation above Salinas. It could also be allowed to flow past Spreckels and augment surface flows in the lower river, thereby benefiting vegetation and wildlife.

If the proposed irrigation demonstration project determines that wastewater irrigation of fresh produce crops near Castroville is not feasible, the five project alternatives may have little influence on local water supply. The location of the regional treatment plant does not facilitate other reuse options (i.e., golf course, landscape, and park irrigation) that would free existing water supplies. Existing plants could be retained to implement some reuse options on a local basis, however. Cities on the Monterey Peninsula are currently investigating local options, but no published information on their investigation is available to date. Deep well injection of the wastewater to form a salt water intrusion barrier might benefit water supplies in the Moss Landing-Castroville area, however. The aquifers being intruded by sea water are used for both domestic and agricultural supply and unless pumping is decreased in the area or freshwater influx to the aquifers is increased, these existing supplies will continue to deteriorate. Aquifer injection was considered in early project planning but was rejected due to its high cost and the potential public health problems associated with wastewater contamination of domestic water supplies.

If local treatment plants are maintained after construction of the regional plant, some wastewater could be locally treated and used to irrigate golf courses, landscaped areas or parks. This possibility is currently being investigated by the Monterey Peninsula cities. This would benefit the local water shortage, but to a lesser degree than a large-scale irrigation project.

Reduced Surface and Groundwater Levels Along the Lower Salinas River. All of the proposed regional wastewater alternatives would eliminate the two Salinas wastewater discharges to the lower Salinas River. In the summer months when these discharges represent most of the surface flow in the river, their removal could eliminate surface flows and would lower the groundwater levels in the surface aquifer along the river.

The current condition of the surface aquifer along the lower river is not well documented. Most of the wells in the area that are monitored by the California Department of Water Resources or the Monterey County Flood Control and Water Conservation District are drawing water from the deeper 180- and 400-foot aquifers (Thorup, pers. comm.; Monterey County Flood

Control and Water Conservation District, n.d.). The latest soil survey of the area indicates that depth to groundwater in soils bordering the river above the lagoon is generally greater than 6 feet (U. S. Department of Agriculture, Soil Conservation Service, 1975). Removal of the Salinas discharges should practically eliminate summer season surface flows between the City of Salinas and Blanco Drain. The groundwater table presently being fed by these flows would lower. The extent of the drop cannot be determined without detailed data on the existing surface aquifer condition.

The impact of this reduced surface and groundwater supply would be felt most by the wildlife and vegetation that currently rely on it. There is little, if any, domestic or agricultural use of surface flows or surface aquifer groundwater downstream from Salinas in the summer. The impact on wildlife and vegetation is discussed in a later section, and mitigations are suggested.

Impacts on Agriculture

When discussing the impacts of irrigation with reclaimed effluent, the question invariably arises, "impacts compared to what?" For example, MPWPCA reclaimed water is substantially better for irrigation than water from some wells in the Castroville area which have been intruded by a large percentage of sea water. On the other hand, it is poorer in mineral quality than Salinas River water flowing above Salinas. This surface water is being sought as part of the Castroville Irrigation Project for use in the Castroville area (the likelihood of this project being implemented is presently questionable, see page 248).

Soils. Alternative 1, of course, has no known impact on agricultural soils. There is no known difference between the impact of Alternative 134 and Alternative 166. They will therefore be considered as one alternative for purposes of this analysis. Alternative 170 is different from Alternative 171 only in that denitrification may occur in the storage reservoir. Although summer evaporation may increase the total dissolved solids (TDS) in the reservoir, winter rains will almost make up the difference, and it is not believed that this report can successfully delineate any differences in this regard.

Salt Buildup Within the Soil. For the purpose of this analysis, salinity is interpreted to be synonymous with TDS. Aside from specific ion effects, which will be discussed later, the danger of damage to crops from high salinity relates to the increased osmotic component of the soil suction, making it more difficult for plants to extract moisture. Ayers and Branson (1974) classify water having specific conductance between 750 and 3,000 µmhos/cm as causing "increasing problems". ("Increasing problems" is used in the context that the problems increase as the water quality degrades from EC 750 to 3,000 µmhos/cm [roughly 470-1,900 mg/l TDS].) A typical EC of the reclaimed water to be delivered for irrigation is 1,223 µmhos/cm, placing it well into the category of "increasing problems". Existing groundwater supplies being used for irrigation in the Castroville area have EC values ranging from 238 to 4,550 µmhos/cm due to sea water intrusion; much of the existing irrigation supply is therefore also of poor quality and will get worse if pumping continues at present levels.

The effect of salinity can be mitigated by leaching to prevent harmful buildup of salts within the root zone. This leaching process, of course, increases the cost for both labor and water, and will be discussed more fully under a later section, as will harmful side effects of leaching.

In vegetable growing, it is a common practice to plant some crops such as lettuce on beds and to irrigate furrows between the beds. The water rises to the top of the beds (subs) by capillary action, and germinates the seeds. This process aggravates the accumulation of salt on the beds. If the water is salty, the humidity low, and high evaporative conditions exist, sufficient salt accumulates on the bed to inhibit the germination of the seeds or burn the seedlings after emergence. This damage is commonly mitigated by sprinkling. The disadvantages of sprinkling will be discussed under the section entitled Agricultural Practices.

Sodium Status of the Soil. Sodium (Na) is important in the soil for two reasons: First, if its ratio to other cations is too high, it can cause deflocculation of the clay colloids, leading to permeability problems. Second, the ion Na can be toxic to plants if its concentration is too high.

The permeability hazard can be evaluated mathematically by the Sodium Adsorption Ratio (SAR),

$$\frac{Na^{+}}{\left(\frac{CA^{++} + Mg^{++}}{2}\right)^{1/2}}$$

where the ions are expressed in equivalents per million.

A modification of the SAR has been developed by the U. S. Salinity Laboratory to adjust it for the added effects of the precipitation of calcium (Ca) and magnesium (Mg) due to the presence of carbonate, bicarbonate or hydroxide in the water. This modified formula is expressed as:

$$\text{SARadj.} = \frac{Na^{+}\ (1 + 8.4 - pH_c)}{\left(\frac{Ca^{++} + Mg^{++}}{2}\right)^{1/2}}$$

where the ions are expressed in equivalents per million, and where $pH_c = (pK_2' - pK_c') + p(Ca + Mg) + Alk$

The SAR and the SARadj values for the effluents under consideration are shown below.

STANDARD AND ADJUSTED SAR VALUES

Treatment Plant	Standard SAR	Adjusted SAR
Salinas #1	6.2	11.3
Monterey	4.5	6.8
Fort Ord	2.1	4.1
Pacific Grove	2.7	5.2
Seaside	5.8	12.6
Marina	a	a
Salinas #2	1.9	3.7
Castroville	3.4	7.8
Flow weighted average	4.3	7.8

[a] Insufficient data

Ayers and Branson (1974) indicate that as water increases from SARadj 6 to 9, there are increasing problems of soil permeability. This concept assumes a leaching fraction of about .3; with a leaching fraction of .07 as assumed in the salinity sections, the SARadj would be approximately doubled (Ayers, pers. comm.). The .07 leaching fraction is recommended as appropriate for use by the University of California (Ayers and Branson, 1974). Based on the above calculations and guidelines, some permeability problems could arise from the use of effluent from the proposed regional plant. The actual significance of this impact can only be determined by the proposed agricultural demonstration project.

Permeability problems related to high SARadj in the irrigation water can be mitigated by the addition of gypsum to the irrigation water. Usual application rate is from 200 to about 1,000 pounds gypsum per acre-foot of water (Ayers and Branson, 1974). Source control of salts entering the waste stream can help reduce SARadj values. Industrial inputs at Salinas should be analyzed to see if they are contributing excessive amounts of salts. If they are, pretreatment might be encouraged or additional industries could be hooked into the Salinas industrial treatment system. Efforts could also be made to reduce salt contributions from water softeners both by educating the general public as to the adverse effects caused by their individual discharges and by controlling inputs from the major water softener reconditioning companies in the area.

Cadmium or Other Potentially Toxic Materials Buildup in the Soil. Some of the soils in the Castroville area contain substantial concentrations of naturally-occurring cadmium (Cd) (Univ. of Calif., Davis, Dept. of Soils and Plant Nutrition, 1973). Therefore, any additional increment of this element is of special concern, both because of its phytotoxic effects and the hazard to the human food chain. Fortunately, the concentrations shown in the available analyses of study area wastewater are very low, and buildup would be slow. For example: Some soils in the Castroville Irrigation District contain as much as 1.5 mg/kg Cd. Twenty years of irrigation with 3 acre-feet of water per year having .004 mg/l Cd (the highest concentrations found in existing waste streams; therefore, a "worst case" estimate) would add about .3 mg/kg to the top 6 inches of the soil, making the maximum concentration of CID about 1.8 mg/kg Cd in the top 6 inches.

The allowable concentrations of Cd in the soil have not been determined as of this writing, nor has the long-term fate of Cd in the soil been agreed upon by scientists studying the phenomenon. The foregoing calculations assume the worst possible situation insofar as soil reactions are concerned. The effect could be mitigated to some extent by heroic plowing to mix the Cd to deeper depths. Obviously, if the .3 mg/kg were evenly mixed to a depth of one foot, the soil concentration would be increased by only .15 mg/kg.

The National Academy of Science (NAS) (1972) has published recommended maximum concentrations of trace elements in irrigation water. The flow-weighted average quality of the combined study area effluents (as estimated by Metcalf & Eddy, 1975) includes copper and manganese levels in excess of the NAS criteria for continuous use on all soils.

Copper and manganese are immobile in the soil and will accumulate in the shallow horizons. The only mitigation known as of this writing is deep tillage. Allowable concentrations have not been determined as of this writing.

Crops

Reduction in Crop Yields Due to Salt Buildup. As stated earlier, crop yield reduction due to salt buildup (aside from specific ion toxicity) is related to the increase in the osmotic component of soil suction. Some species are more tolerant of salinity than others. Ayers and Branson (1974) have classified crops according to their salinity tolerances as well as yield decrement to be expected with certain management practices. Among the more tolerant crops which are being grown in the CID area are tomatoes and the cole crops (cabbage, cauliflower, etc.). Lettuce is more sensitive to salt buildup, as are beans; and strawberries are among the most sensitive of all the crops. Little information is available on artichokes, but Metcalf and Eddy (1975) classify them as highly tolerant to salinity, based on Tunisian data (see Table 41).

Table 41

CHEMICAL SENSITIVITIES
AND FERTILIZATION APPLICATIONS FOR
SELECTED CROPS GROWN IN MONTEREY COUNTY

Crop	Salinity tolerance[a]	Relative boron tolerance[b]	Nitrogen application, lb/acre/crop
Lettuce	Low	Tolerant	150-250
Artichokes	High	Tolerant	200-300
Broccoli	Moderate	Semitolerant to tolerant	150-300
Cauliflower	Moderate	Semitolerant to tolerant	175-265
Tomatoes (fresh produce)	Moderate	Semitolerant	150-200
Celery	Low	Semitolerant	500
Strawberries	Low	Sensitive	100-150

a. High: conductivity <10,000 μmhos/cm; moderate: conductivity <4,000 μmhos/cm; low: conductivity <2,000 μmhos/cm [25].

b. Tolerant: boron <4 mg/l; semitolerant: boron <2 mg/l; sensitive: boron <1 mg/l [25].

Source: Metcalf & Eddy, 1975.

The effects on crops of increased salinity in irrigation water can be mitigated by appropriate leaching. Table 42 illustrates the minimum leaching required to maintain full production with the reclaimed water compared with the water that may become available through CID. Well waters in the CID are so variable that averages are not very meaningful, ranging from EC 238 to 4,550 µmhos/cm (Monterey County Flood Control and Water Conservation District, n.d., TDS levels range from 420 to 3,500 mg/l). If leaching is utilized to counterbalance increases in irrigation water salinity, the impact this might have on groundwater must be considered. In areas where the surface aquifer is already of poor quality and is not being used for domestic or agricultural purposes, the added leaching of salts would create no new problems. However, if good quality groundwater could be affected, it may be necessary to install tile underdrains to avoid undesirable salt buildup in the groundwater.

Table 42

COMPARISON OF LEACHING REQUIREMENTS*
FOR CROPS WITH TWO ALTERNATIVE WATER SOURCES

Crop	Average Reclaimed Water (EC 1,200 µmhos/cm)	CIP Water at Spreckels Diversion	
		(EC 388 µmhos/cm)**	(EC 638 µmhos/cm)***
Tomatoes	10%+	3.0%	5.0%
Broccoli	8%	2.5%	4.0%
Cabbage	8%	2.5%	4.0%
Lettuce	12%	3.0%	6.0%
Strawberries	20%	7.0%	10.0%

* Based on Guidelines for Interpretation of Water Quality for Agriculture, U. C. Committee of Consultants, December 1, 1974; and assuming 60% irrigation efficiency.

** EC estimate based on conversations with Central Coast RWQCB staff and review of water quality data collected at Gonzales; this is best-case estimate.

*** EC estimate from average quality of diverted water reported in the Castroville Irrigation Project Report (U. S. Bureau of Reclamation, 1974).

+ Percent of applied water that must pass the root zone to avoid exceeding salt tolerance, assuming 60% irrigation efficiency.

Reduction in Crop Yield Due to Specific Ion Toxicity. Boron (B): Although NAS (National Academy of Science, 1972) limits water to .75 mg/l B for waters used continuously on all soil, higher concentrations are tolerable where tolerant crops are grown. As stated earlier, annual crops such as lettuce, celery and cabbage are tolerant to B. No data are available for artichokes. If the irrigation water is a composite of all the cities, the B concentrations will slightly exceed the limit set by Ayers and Branson (1974) for sensitive crops, but will be below the NAS limit.

Good mitigation measures are not available for B toxicity. This element can be leached from the root zone only with difficulty, and with considerable expense.

Chlorides (Cl): Strawberries are the most sensitive to chlorides of the crops being grown in or near the CID, but if sprinklers are used in low-humidity, high-evaporative conditions, chlorides may cause a problem on a wide range of crops. Ayers and Branson (1974) indicate increasing problems as the chlorides increase above 106 mg/l. They further indicate increasing problems from root absorption as the chlorides increase from 142 to 355 mg/l. Based on the available analyses, the weighted average effluent would create problems of leaf burn if sprinklers are used under low humidity, high evaporative conditions. These conditions infrequently exist in the Castroville area, so the real threat of damage is low. Some problems with root absorption should be expected, however.

Chloride damage to foliage by sprinklers can be mitigated to some extent by nighttime sprinkling. The effects of nighttime sprinkling on cultural practices will be discussed later. Damage through root absorption can only be mitigated by increased leaching and the growing of tolerant crops. As pointed out in the introduction to this section, however, the effluents may cause considerably less damage to crops than some water from wells that have been intruded by sea water.

Sodium (Na): Like chlorides, NA can damage plants either by burning the leaves if they are sprinkled on hot dry days, or by being absorbed through the roots. Ayers and Branson (1974) indicate increasing problems with foliar burning as the Na concentrations exceed 69 mg/l in the irrigation water, and increasing problems due to root absorption as the SARadj increases from 3 to 9. They indicate severe problems if the SARadj exceeds 9. Based on the available analyses, the weighted average effluent could cause some problems of leaf burning, especially if sprinkled under low humidity, high evaporative conditions. It would also create some problems due to root absorption. The actual threat of sodium damage in the Castroville area is greater than the threat from chloride due to the relatively high levels of NA in the flow-weighted effluent.

Sodium damage to foliage as a result of sprinkling can be mitigated to some extent by nighttime sprinkling. Damage due to root absorption can be mitigated by growing tolerant crops, and by increasing the leaching. As with chlorides, however, the effluent water may be considerably less damaging than water from sea water-intruded wells.

Nitrates (NO_3): Baier and Fryer (1973) point out that excessive nitrogen (N) fertilization can reduce crop yield or crop quality, even though it may not necessarily be toxic. For example, tomatoes that are over-fertilized may "go vegetative", produce beautiful vines but inferior fruit. The crops most likely to have this problem in the CID area are strawberries, tomatoes and sugar beets, none of which occupy large acreages. The damage can be mitigated by using low N water for irrigation at the critical stage of growth. In this respect, Alternative 170 would be more advantageous than Alternatives 166 or 171 because the water in storage in the reservoir will likely become denitrified and could be used for N sensitive crops. Depending upon the size and retention time of the equalizing reservoir in Alternative 134, some manipulation may be possible to reduce the N concentrations for these special groups. It is recognized that such manipulation may cause logistic problems for the water supplier. If the high N water is used on sugar beets or tomatoes throughout the growing season, the possibility of crop damage is high.

Effect of Effluent Irrigation on Agricultural Practice. A reliable surface water supply of reasonable quality is a great asset to any irrigation farmer. He is freed of cares about pumps that fail in mid-irrigation season, rising power costs, standby charges, and in the case of CID, sea water intrusion. He can, if he wishes, ordinarily call for a bigger head of water than is available from his own well. He can devote his energies to farming rather than to being a water supplier. For those farmers whose wells have been intruded by sea water, the effluent may represent a substantial improvement in water quality.

Reclaimed effluent delivered under Alternative 166 is estimated to contain 30 mg/l of N and 1.5 mg/l of phosphate (P). At the prevailing price of \$0.15 to \$0.25 per pound for N, the value of that constituent (when needed) ranges between \$12.21

and $20.35 per acre-foot. The cost of fertilizer has been steadily increasing, so the value of the N and P in applied wastewater would also increase with time. Under Alternative 170, and to a lesser extent 134, the N concentration may be somewhat lower, depending upon retention times in the reservoirs. The value of the P in the water is relatively less than it is for N because to have maximum value, in addition to being needed, P must be strategically placed in the soil near the germinating seed. Nevertheless, phosphate in the water has some small finite value in building up the general fertility level of the soil. Nutrients in wastewater have a small additional value in that they are applied simultaneously with irrigation water, reducing somewhat the separate fertilizer application costs.

Mitigation measures indicated in earlier sections of this report frequently included increased leaching. Table 42 shows quantitatively how much additional leaching would be required as compared to stored water. Additional leaching involves extra expense for equipment, labor, and power. It also implies additional drainage requirements. For some farmers, this means installation of artificial drainage structures such as tile drains, interceptor ditches, etc. Furthermore, whenever leaching occurs, the nitrates are flushed from the root zone along with the chlorides and other salts. This represents an economic loss to the farmer and may aggravate the waste disposal problem. Finally, it raises the question of disposal of irrigation return waters. At this time the California State Water Resources Control Board (SWRCB) has not developed a clear policy relating to these permits (Peck, pers. comm.), particularly when the water source is reclaimed effluent.

California Department of Health (1974) guidelines state that irrigation wastewaters shall be confined to the area designated and approved for disposal and reuse. They further imply that additional medical care should be furnished to workers, protective clothing should be provided, and harvesting operations at times may be delayed. These guidelines do not at this time have the force of law, but it is possible that the appropriate agency may translate them into regulations or permit requirements in the future.

Sprinklers have been suggested as a mitigation measure for certain problems. They also have drawbacks, one of which is energy consumption. For example, Baier, et.al. (1975) estimate that the use of sprinklers will increase power consumption an additional 476 to 544 kwh per acre. The second drawback is in increased labor costs, ranging from $1.50 to $32 per acre per year, depending upon the capital investment, which ranges from $17 to $97 per acre per year. Average total costs of sprinklers over gravity methods are estimated to be $30 per acre per year in 1973 dollars (Baier, et.al., 1975). These estimates are national averages. The small farm sizes and labor intensiveness of agriculture in the Castroville area indicate that added costs would be on the high end of the range for this area, probably well above the $30 average for total costs.

Nighttime sprinkling has been suggested as a mitigation for leafburn from salts. Such measures decrease the effective operating time of sprinklers, and thereby increase the capital investment required, probably by a factor of 2. Night irrigation provides a small increase in efficiency of water use, but the savings do not compensate for the reduction in available irrigation time.

Growing tolerant crops has been suggested as a mitigation measure for certain impacts of using sewage effluent for irrgation. Often, growing different crops decreases farm income, usually because the new crop has lower value and/or higher production costs. Farmers therefore would be likely to resist this option.

One of the most important issues involved with using sewage effluent for irrigation is the intangible factor of consumer resistance, especially to the two most important crops in the lower Salinas Valley, namely, lettuce and artichokes. This resistance (if it exists) can be mitigated only over a long period of time by an educational campaign. There are currently many agricultural areas throughout California and the United States that are irrigating crops with wastewater, with little or no public disfavor. However, the crops being irrigated are generally feed, fiber or processed food crops. Large-scale wastewater irrigation of unprocessed food crops (i.e., lettuce, artichokes, etc.) is not currently being attempted in California.

Even though it is assumed that the reclaimed water will be at least as good as required by the State of California Department of Health Guidelines for Use of Reclaimed Water for Spray Irrigation of Crops, there may be resistance to its use by local regulatory agencies.

Seismic Risks

Threat of Interceptor or Outfall Rupture from Seismic Activity. The proposed wastewater interceptor from Monterey to the regional treatment plant site crosses five potentially active faults (demonstrable seismic activity between 200 and 2,000,000 years ago) (Burkland & Associates, 1975). This includes the Navy, Seaside, Ord Terrace, Chupines and Reliz-Rinconanda faults. The first four are intersected between the existing Monterey treatment plant and the southern boundary of Ft. Ord. Interceptor Routes A1, A2, B1 and B2 are crossed in this stretch. All except B2 are force mains; B2 is a gravity line. Their design average dry weather flows are between 10.5 and 13.7 mgd. The Reliz-Rinconanda fault is crossed by the E routes near their junctions with the Salinas River and by the combined D-E trunk as it turns northward just east of Marina. Both pipelines are force mains; the combined line has a design average dry weather flow rate of 28.3 mgd. The E line design average flow rate is 13.07 mgd. The active San Andreas and Palo Colorado-San Gregorio fault zones border the study area on the north and south.

The seismic hazard evaluation of the entire county conducted by Burkland & Associates (1975) identified the most widespread potential for vibration damage, ground rupture and liquefaction to be along the faults mentioned above. The vibration damage and liquefaction potentials are also extensive in the alluvial soils along the Salinas River. Both the Castroville and Salinas interceptors cross the Salinas River. The evaluation did not attempt to estimate the magnitude or probable occurrence of these seismic hazards, only their presence relative to other parts of the county. A reconnaissance geotechnical study of the project area conducted by John V. Lowney & Associates (1976) indicated that the potential hazard to facilities from fault offset is minimal. However, they predicted the area is "likely to be subjected to at least one moderate to major earthquake causing moderate to severe ground shaking during the design life of the project". The treatment plant will be designed to withstand small tremors that might be expected to occur.

Should an earthquake of large magnitude occur along any of the faults that intersect interceptors, or other faults in or near the study area, there is a possibility of rupture of the interceptors. These interceptors are common to all of the alternatives. The rupture of raw sewage interceptors would undoubtedly create a local health hazard and could lead to contamination of surface waters, including Monterey Bay and the Salinas River. This could have an added adverse impact on wildlife utilizing the waters. A pipeline rupture would also temporarily interrupt sewer service to part of the study area. If water lines in the area are ruptured simultaneously, there may be little or no sewage to convey.

The land portion of the ocean outfall planned as part of Alternatives 1 and 166 is located in geotechnical interpretive Zone VI in the Burkland report (1975). This zone indicates a high prevalence of conditions favorable to vibration damage, ground rupture and tsunami damage. Three of the four proposed outfall routes also cross Salinas River alluvial soils. Only outfall route 3 avoids alluvial material. Although the outfall does not cross any known faults, a large magnitude earthquake in the area could rupture the pipe. The public health and wildlife threats would be less than with the interceptors, as the outfall would carry treated wastewater.

A reconnaissance geotechnical investigation of interceptor routes was conducted by John V. Lowney & Associates (1976) to identify specific hazardous conditions and their locations. A similar investigation will be conducted along the ocean portion of the outfall. The Lowney report concluded that the potential seismic hazard to land-based facilities due to fault offset is minimal, but the area is likely to experience at least one moderate to major earthquake causing moderate to severe ground shaking during the design life of the project.

The alternative interceptor and ocean outfall routes analyzed in this report do not provide for significant mitigation of the seismic risks. In order to avoid crossing the five faults mapped along the edge of Monterey Bay, the regional treatment plant would have to be relocated inland or the Monterey interceptor would have to detour inland around the mapped fault traces. This would not necessarily guarantee a lesser seismic risk and could increase costs and energy consumption, depending on what disposal mode is eventually adopted. The coastal location seems most appropriate for ocean disposal of wastewater. The engineering specifications and design of the interceptors should consider the seismic hazards mentioned above, especially with reference to liquefaction and vibration damage. Shut-off valves at intervals along the pipes could be used to isolate ruptures and minimize the size of a spill should damage occur.

Use of Alternate Route 3 for the land portion of the ocean outfall would avoid a crossing of alluvial soils and could therefore institute a minor reduction in the seismic threat to that pipe. Engineering and design specifications should take into consideration the more detailed material being developed by the geotechnical survey on specific land and ocean outfall routes.

Threat of Damage to and Disruption of the Regional Wastewater Treatment Process and Facilities. Seismic events associated with the faults mentioned above could affect the treatment facilities as well as the interceptors. Each of the six alternative treatment plant sites (which are common to all of the project alternatives) being analyzed are within seismic interpretive Zone VI of Burkland & Associates (1975). This zone has a high prevalence of conditions favoring vibration damage and ground rupture during a seismic event. Site 4 also includes an area of seismic interpretive Zone IV which has a lower prevalence of these conditions (see Figure 28 and Table D-2 for details). Analysis of this general information indicates that Site 4 may therefore offer the best chance of avoiding seismic damage to the regional treatment plant. Site specific geotechnical evaluations now being conducted will better define the hazards on each site.

The threat of seismic damage to treatment facilities does not vary greatly between the various project alternatives. Generally speaking, however, the less complex the treatment system, the lower the risk of seismic disruption. Alternatives 1 and 171 have relatively simple systems, while Alternatives 134 and 170 require storage ponds and pump-back equipment. Alternative 166 lies somewhere between these two groups. Ranking of treatment facilities from most likely to least likely to receive seismic damage is therefore 170, 134, 166, 171 and 1.

If the treatment processes were interrupted but the plants continued to receive untreated wastewater, the small emergency storage reservoirs designed into Alternatives 134 and 166 would offer the least damaging interim disposal method. If the damage were major, requiring an extended period of plant closure, discharge through an outfall to the ocean might be more desirable. Bypassing to the large storage reservoirs of Alternatives 134 and 170 would create local odor problems and would probably require re-treatment of the entire contents of the reservoirs. Bypassing raw sewage to the percolation ponds of Alternative 171 would create odor problems and could lead to contamination of the groundwater mound used for agricultural irrigation.

In order to mitigate these potential hazards to treatment facilities, the results of the detailed geotechnical evaluation now in progress should be utilized to site and design the regional treatment plant. If serious seismic hazards are found on all of the proposed treatment plant sites and design specifications do not appear to be adequate to reduce the hazards, other sites should be investigated.

Tsunami Hazard. The Monterey Bay coastline has experienced minor tsunamis in the past. None of the alternatives would place treatment facilities immediately along the coast where future tsunamis would pose a threat, but treatment plant sites 3 and 6 could conceivably be affected by run-up from an extremely large wave moving through the mouth of the Salinas River. Each of these sites has elevations of from 10 to 20 feet above sea level and are at least 1,000 feet away from the river. The tsunami study conducted in Monterey Bay (Garcia and Houston, 1975) did not estimate effects on the river above the mouth, but predicted a 100-year frequency runup of 5.9 feet at the coast. With a 500-year frequency runup of 11.6 feet, tsunami damage to treatment facilities is extremely unlikely.

The ocean outfalls of Alternatives 1 and 166 and to a lesser extent the lagoon or lower river outfall of Alternative 134 would be more susceptible to seismic sea wave damage. These structures must be designed to withstand liquefaction and vibration hazards related to earthquakes; the tsunami hazard should also be taken into consideration in design.

Mitigation of the tsunami hazard is primarily a structural design matter. Alternatives without ocean outfalls (Alternatives 134, 170, and 171) avoid any significant possibility of tsunami damage to facilities.

Impacts on Air Quality

Production of Noxious Odors from Treatment Facility Operation. The transport and treatment of domestic sewage often creates local odor problems. The gases produced by decomposing organic matter are generally considered an undesirable nuisance at best. Anaerobic decomposition creates the greatest problem. The gases may emanate from vents in raw sewage interceptors, treatment plant headworks, sludge drying beds and digestors, aeration lagoons, or from discharge locations. Treatment process upsets and plant breakdowns often lead to severe odor problems.

The proper engineering design combined with the proper operation of wastewater treatment facilities would control the production and release of odors to concentration levels not detectable beyond the treatment facility boundary. Preliminary design of the project alternatives includes covering of the primary sedimentation tanks to minimize odors from this stage of the treatment process. If standby power generation equipment is installed, there should be no chance of the plant contents reaching an anaerobic (odor producing) condition during a power outage.

As raw sewage will spend considerable time reaching the regional facility, injection of air into all force mains is recommended to prevent anaerobic conditions. Regardless, the plant headworks should be covered to prevent the release of odors as the raw sewage enters the plant.

Secondarily treated wastewater would be stored in open reservoirs in Alternatives 134, 166 and 170. To eliminate the chance of odor production, filtration and partial disinfection should be provided after secondary treatment and prior to pumping to storage. Use of project Alternatives 1 or 171 would avoid the potential odor problems of surface storage. Most of the proposed treatment plant sites are sufficiently remote from residential, recreational, and commercial areas to avoid complaints. Use of the easterly portions of Sites 4 or 5 would be most effective in removing the plant from most human contact. However, if the City of Marina expands northward into the area planned for urban expansion on the Marina Master Plan, a conflict between residential and/or commercial land uses and the treatment facilities could eventually occur. Future planning and development in the area should be designed to avoid this confrontation.

Production of Other Air Pollutants. Operation of equipment and vehicles in and around the treatment plant will generate small amounts of hydrocarbons, nitrogen oxides, carbon monoxide and possibly other pollutants. The amounts have not been calculated, but they should be quite small. Vehicles used on-site should be fitted with appropriate emission control devices to limit production of pollutants. Air pollutants associated with anticipated population increases in the study area are discussed in the Secondary Impacts section.

Public Health Impacts

Possible Biological and Chemical Contamination of Groundwater Supplies. All alternatives which would supply reclaimed water for crop irrigation near Castroville include tertiary (level IV) treatment, which is recognized by the California State Health Department as sufficient treatment for unrestricted irrigation practices (see Appendix O for regulations). The applied irrigation water would be disinfected and would spend a considerable time in the aerobic soil layer, making the chance of any adverse biological change (addition of pathogenic bacteria and viruses) in the groundwater quite small. Numerous studies have indicated that most bacteria and viruses are filtered out in the first few feet of soil mantle (Pound and Crites, 1973; Metcalf & Eddy, 1975; Drewry and Eliassen, 1968). Some areas in the lower Salinas Valley experience seasonal high water tables, but this generally occurs in the winter nonirrigation months. In addition, the surface aquifer is already of poor quality and not generally used for domestic or agricultural purposes.

The possibility of nitrates reaching usable groundwater in the proposed irrigation area of Alternatives 134, 166, 170 and 171 was discussed under groundwater quality impacts. The threat of contamination by various potentially toxic chemicals and stable organic compounds was also discussed in that section.

Alternative 171 represents a unique problem from a public health standpoint. Infiltration/percolation of a secondary treated effluent to groundwater storage allows a probability for biological and chemical contamination of otherwise suitable domestic water supplies. It is felt that for this alternative to be feasible, detailed geologic and hydrologic studies would be required to find a storage area which is already isolated from usable groundwater supplies, or one which could be operated to keep the percolated water distinctly isolated from other groundwater supplies. Preliminary analysis of the probable storage area by Metcalf & Eddy (1975) indicates that it may be sufficiently isolated from the 180-foot aquifer to allow its use for wastewater storage.

The likelihood of contaminating groundwater stores can be kept to a minimum in irrigation areas by strictly maintaining State Health Department wastewater quality standards for irrigation and by managing wastewater application to minimize percolation to the groundwater table. Wastewater application rates should be tailored to soil percolation rates and evapotranspiration. Hydraulic overloading should be avoided. Wastewater irrigation should be avoided in areas where domestic wells still tap the surface aquifer. If necessary, a well-monitoring program could be established to detect any biological or toxic chemical contamination of usable groundwater stores. In areas where leaching of salts from the soil is necessary because of the salt content of reclaimed wastewater, it may be necess[illegible]o install tile underdrains to avoid deterioration of surf[illegible] aquifer groundwater stores still in use.

A lined surface storage reservoir should be included at the regional plant site of all reclamation alternatives to temporarily hold poorly treated or untreated effluent in case of plant malfunctions. Small reservoirs are being planned for Alternatives 134 and 166 for just this purpose. Some efficient means of detecting treatment disruptions must be included to avoid distribution of poorly treated effluent to the irrigation systems.

Reduced Health Hazard in Surface Waters. All five of the major project alternatives would eliminate several existing sources of surface water contamination. Elimination of sewage discharges to Tembladero Slough, the Salinas River (near Salinas) and the nearshore shallow waters of southern Monterey Bay would reduce the level of biological contaminants presently found in those waters. The existing sewage discharges have adversely affected recreational uses in the lower Salinas River, Elkhorn Slough and occasionally the beaches of the southern bay for many years by contributing bacterial contaminants in excess of recommended standards for water contact recreation and shellfishing.

The level and location of health hazard reduction varies slightly among the alternatives. All would eliminate the two City of Salinas discharges to the Salinas River and alleviate a health problem in that area. The existing southern Monterey Bay and Tembladero Slough discharges would also be removed by each alternative. Elimination of the Tembladero Slough discharge, combined with sewering of the Moss Landing and Los Lomas areas, should reduce bacterial contamination of shellfish in Elkhorn Slough. This is highly desirable, as shellfish harvesting is a beneficial use assigned to the slough by the State Water Resources Control Board Water Quality Control Plan. The reduction may not be sufficient to allow harvesting to be reestablished, however. Alternative 1 would concentrate and relocate wastewater discharges to a point over one mile offshore in central Monterey Bay. Little or no water contact recreation occurs in the proposed outfall location. Therefore, it should not create a new health problem. Only if the treatment plant were to malfunction or be disrupted by a natural disaster (earthquake, flood) and discharge untreated wastes would a significant health hazard be created. Oceanographic studies being conducted by the project engineers will provide better information to assess the health risks of this ocean discharge, especially the possibility of ocean currents carrying wastewater back toward shallow water and beach areas.

All of the irrigation reuse alternatives (134, 166, 170 and 171) would result in drainage of some tertiary treated (level IV) effluent to surface ditches and agricultural drains in the Castroville area. These in turn flow into the Salinas River, Old Salinas River and Elkhorn Slough. Disinfection of the wastewater prior to irrigation reuse would reduce total coliform counts to 2.2 MPN/100 ml, however. This is well below the basin plan recreational use standard (200 MPN/100 ml fecal coliform for contact recreation). Elimination of the Castroville discharge and sewering of the Moss Landing area would reduce the public health problems in the Old Salinas River and Elkhorn Slough to a much greater extent than the wastewater in agricultural drainage could increase them.

Alternative 134 creates a slightly different situation in the lower Salinas River and lagoon, and to a lesser extent in Old Salinas River and Elkhorn Slough. In the first stage of development, Alternative 134 would discharge the region's wastewater to the lower river year-round. The upstream Salinas discharges would be removed. The river discharge would contain not more than 2.2 MPN/100 ml total coliforms. Treatment process upsets or plant breakdown could create short-term contamination in excess of this level, but this should be extremely rare, as an emergency storage reservoir is provided in this alternative. If second stage development of Alternative 134 occurs (irrigation reuse), summer discharges to the lower river would be infrequent, but winter discharges would continue.

The coliform count contained in the discharge would be low enough to meet basin plan water contact recreation standards (200 MPN/100 ml fecal coliform) and the State Department of Health standard for unrestricted recreational impoundments (2.2 MPN/100 ml, California Administrative Code, Title 17, Section 8047). Currently, the RWQCB does not consider water contact recreation a beneficial use in the lower Salinas River, but it is an assigned beneficial use in Elkhorn Slough and the coastal waters of Monterey Bay.

In summary, the Alternative 134 discharge of wastewater (level III or V) to the lower Salinas River would have lower bacterial and viral concentrations than the existing surface waters, but could still represent a health hazard to water contact recreationists in the lower river, in Elkhorn Slough, and in nearshore ocean waters in the vicinity of the mouth of the Salinas River if treatment plant malfunctions occur. Other factors (i.e., agricultural drainage) continue to adversely affect the beneficial uses of the lower Salinas River. Therefore, Alternative 134 would not in itself allow complete attainment of the "fishable-swimmable" goals of PL 92-500. The net effect of this alternative, however, would be to improve public health problems in the area's surface waters.

Possible Biological Contamination of Fields and Crops. All of the irrigation reuse alternatives would spread treated effluent on fields and crops in the lower Salinas Valley. Because most of these crops are sold to the public as unprocessed fresh produce and may be spray irrigated, the State Department of Health requires a high degree of water treatment (level IV) pricr to irrigation (see Appendix O for reclamation criteria). This level of treatment is deemed sufficient to protect the public from bacterial and virus infection.

The real threat to public health is an undetected failure of the wastewater treatment process, leading to irrigation with heavily contaminated water. The other significant risk is associated with accidental or unknowing drinking (or inhaling) of wastewater in the fields by farm workers. The likelihood of these events occurring is about the same for each of the four reclamation alternatives. Alternative 1 does not include crop irrigation with wastewater.

The possibility of crop contamination and infection of farm laborers could be reduced by utilizing the most reliable treatment system possible and constantly monitoring the quality of reclaimed water transported for irrigation. A system for rapid detection of plant malfunctions and diversion of poorly treated effluent should be established prior to implementation of irrigation reuse. The State Department of Health Wastewater Reclamation Criteria (Appendix O) include these and other system requirements. In addition, the Department of Health guidelines for use of reclaimed water for spray and surface irrigation of crops, and for worker protection at water reclamation use areas (California Department of Health, 1974) should be adhered to at all times (see guidelines in Appendix O). Normal county and state health department monitoring of crop quality should also reduce the likelihood of bacterial or virus-contaminated produce reaching the public.

Increase in Vector Populations. All of the proposed wastewater systems except Alternative 1 could lead to local increases in vector populations. The wastewater irrigation planned for the four reclamation alternatives will not increase vector breeding habitat. The wastewater will simply take the place of well water now used for irrigation. The wastewater storage/disposal facilities associated with Alternatives 134, 170 and 171, and possibly Alternative 166, would be the most likely sources of vector populations.

Alternative 134 requires approximately 120 surface acres and Alternative 170 nearly 900 acres for wastewater storage. Alternative 171 includes up to 185 acres of percolation ponds. These water bodies will provide breeding habitat for mosquitos unless properly constructed and maintained. Some species of mosquitos found in this area have been known to be carriers of several diseases harmful to man, including encephalitis and malaria. Shallow water areas supporting aquatic vegetation are especially conducive to mosquito breeding. The peak breeding seasons are spring and summer.

Alternative 134's reservoir is to be used only for storage during the irrigation season (usually late spring to early fall) and its water level will fluctuate considerably. This will reduce the potential for vector outbreaks. The percolation-infiltration ponds of Alternative 171 will be used year-round and will provide extensive shallow water and puddle environments. These conditions are ideal for mosquito breeding. Periodic drying of these beds is necessary to maintain aerobic soil conditions, however. This will help keep the mosquito populations in check. The large surface reservoir planned as part of Alternative 170 will also be wet practically year-round. It will undoubtedly have an extensive shallow water shoreline and might therefore have the greatest potential for vector problems. Alternative 166 includes an emergency storage pond; it may also be an occasional source of mosquitos.

All of these facilities are planned for the dunelands north of the City of Marina. Should that city expand northward as proposed in the Marina Master Plan (Monterey County Planning Commission, 1967), an urban population would be brought into close proximity to a potential vector problem.

The local mosquito abatement district should be consulted and utilized to monitor and control insect vectors. Reservoir and percolation pond embankments should be sloped at 2:1 or steeper and aquatic vegetation should be discouraged on the perimeters to minimize breeding habitat. Fluctuation of standing water levels will also reduce habitat. Mosquito fish (Gambusia affinis) and other small fishes could be stocked in the reservoirs as an abatement measure. However, 1 ppm of residual chlorine is toxic to these fish. Aeration or short-term intermediate storage of chlorinated effluent prior to discharge to the larger storage/percolation areas could protect the fish. Chemical sprays are also effective in mosquito control but can have undesirable side effects on resident fauna, including extermination of beneficial insect species and gradual bioaccumulation of the chemicals in larger animals.

Elimination of Septic Tank Seepage to Groundwater Supplies. The Facilities Plan calls for eventual hookup of several presently unsewered areas to the regional wastewater system. These include Moss Landing, some parts of Castroville, Prunedale, small developments north of Salinas, and low density development in the Monterey-Salinas corridor. These areas are currently using septic tanks. By eliminating the septic tanks, the possibility of contaminating usable groundwater supplies will be reduced. Groundwater immediately below Moss Landing and Castroville is not being used for domestic or agricultural purposes, as its quality is already poor. The water below Prunedale and the Monterey-Salinas corridor is still being used, however. There are no indications of wastewater contamination in these areas to date, but continued septic tank use could lead to problems.

Impacts on Terrestrial Wildlife and Vegetation

Changes in Riparian Vegetation. Riparian vegetation borders much of the Salinas River in its lower reaches. The vegetation is supported by a groundwater source and surface flows. Surface flows from the USGS gauging station at Spreckels to the Salinas River lagoon maintain some areas of *hydrophyte* and *phreatophyte* vegetation in the stream channels. The elimination of wastewater flows will likely reduce or eliminate the hydrophytes but will probably have little impact on phreatophytes. Much of the lower Salinas River is a "losing" river with more subsurface than surface flow. Phreatophytes (most riparian species) typically derive moisture from the subsurface water source. To what degree wastewater flows contribute to the underflow of the river is not known; however, it is unlikely that the elimination of wastewater will significantly alter subsurface flows.

Under natural conditions (pre-wastewater discharge and pre-dam construction), much of the lower river was dry during the summer months. This was due to a number of factors, including the lack of rain, and the extensive percolation capacity of the Salinas Valley floodplain. This lack of water probably had a limiting effect on riparian growth, and in fact, during abnormally dry periods, vegetation dieoff probably occurred.

The introduction of wastewater discharges and numerous small agricultural diversions, and the regulation of downstream flows by Nacimiento and San Antonio Dams have altered the natural flow regime. Those changes plus the effects of agricultural runoff have influenced growth of riparian vegetation along the river.

Figure 38 depicts the known and likely existing sources of water to the lower Salinas River. While it is obvious that the Salinas sewage treatment plants contribute to the surface water, there are other point and nonpoint sources that will remain unaffected by the regionalized sewage system. They will continue to contribute water to the river and to support riparian growth.

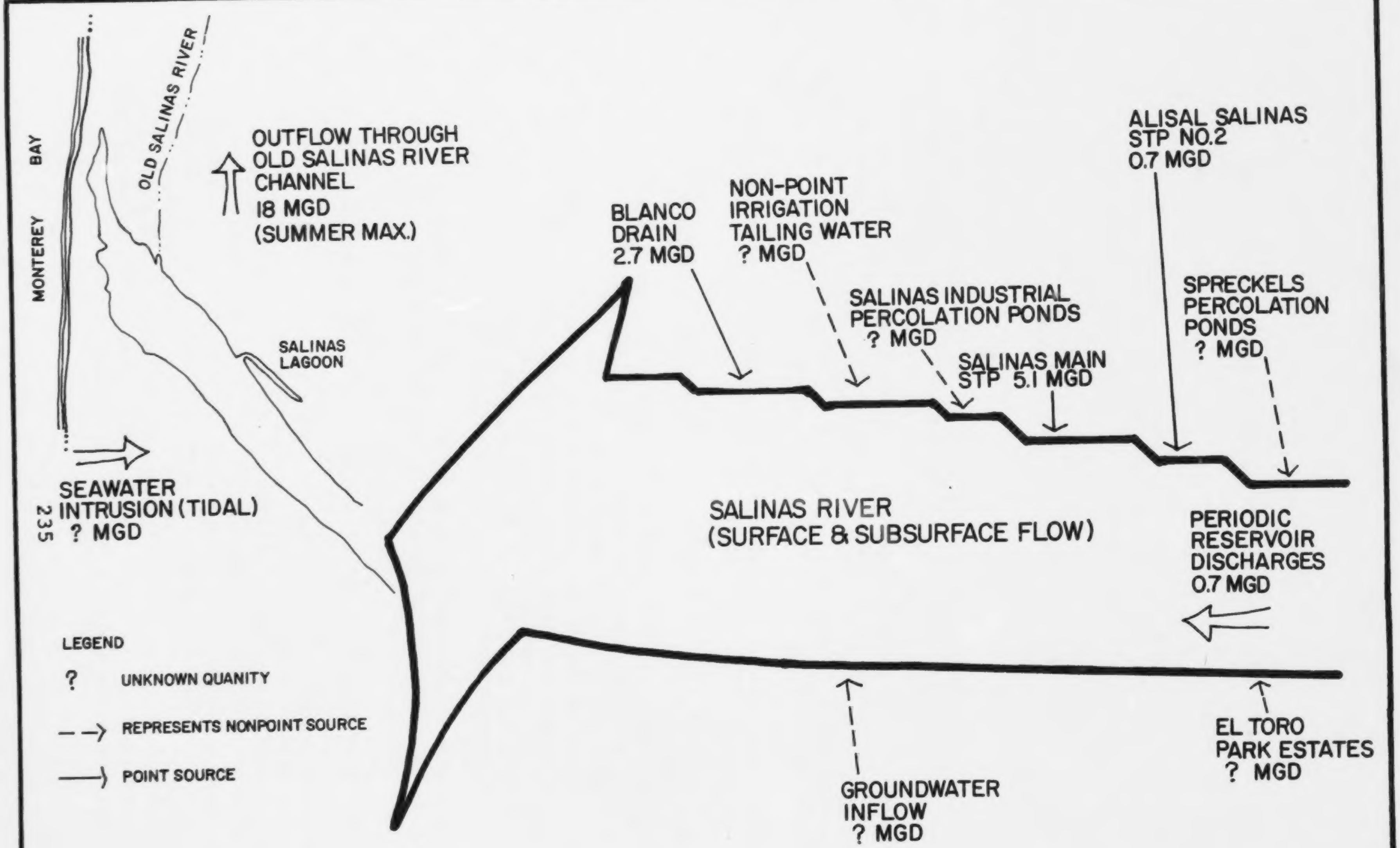

MONTEREY BAY
OLD SALINAS RIVER
OUTFLOW THROUGH OLD SALINAS RIVER CHANNEL 18 MGD (SUMMER MAX.)
SALINAS LAGOON
SEAWATER INTRUSION (TIDAL) ? MGD
BLANCO DRAIN 2.7 MGD
NON-POINT IRRIGATION TAILING WATER ? MGD
SALINAS INDUSTRIAL PERCOLATION PONDS ? MGD
SALINAS MAIN STP 5.1 MGD
ALISAL SALINAS STP NO.2 0.7 MGD
SPRECKELS PERCOLATION PONDS ? MGD
SALINAS RIVER (SURFACE & SUBSURFACE FLOW)
PERIODIC RESERVOIR DISCHARGES 0.7 MGD
GROUNDWATER INFLOW ? MGD
EL TORO PARK ESTATES ? MGD
LEGEND
? UNKNOWN QUANITY
- -> REPRESENTS NONPOINT SOURCE
—> POINT SOURCE

FIGURE 38 POINT AND NON-POINT LOW FLOW (JUNE-SEPTEMBER) SOURCES OF WATER TO THE SALINAS LAGOON

Any impacts on riparian vegetation could be reduced or eliminated in part by implementing any of the four potential mitigation alternatives -- 1) retention of summer wastewater flows by the City of Salinas sewer treatment plant; 2) pumping effluent via pipeline to discharge into the river; 3) develop a wellfield to pump groundwater to the river; and 4) release additional water from San Antonio or Nacimiento Reservoirs. If flows from any of these sources are less than existing wastewater flows, there will likely be a minor impact on hydrophytic plants now growing on the fringes of the wetted perimeter of the streamway.

Impact on Terrestrial Wildlife. Any vegetation changes resulting from the reduction of wastewater flows in the Salinas River will directly affect attendant wildlife. The reduction of streamflow can cause a change in quantity of habitat and wildlife, or a change in quality and distribution of vegetation and attendant wildlife. Virtually no information exists regarding the downstream streamflow requirements for wildlife (U. S. Fish and Wildlife Service, 1976).

The reduction of streamflow could affect vegetation and wildlife in the following ways:

a. Remove drinking water for terrestrial birds and mammals.
b. Directly affect "aquatic" wildlife such as beaver or muskrat by eliminating the water environment they rely on for protection.
c. Lowered water tables can alter riparian vegetation, eliminating essential elements of habitat for some wildlife species.
d. Changed patterns of flooding may affect willows or marshes dependent on flood water for maintenance.

Only the first two of these are direct; yet they are not likely to be of major importance unless all flow in the river is stopped completely.

Item c, the reduction of water table and subsequent alteration of riparian vegetation, is not likely to represent a major impact of wastewater flow elimination. Riparian vegetation is supported almost exclusively by subsurface supply and therefore will not be substantially affected. Those wildlife species dependent on hydrophytic vegetation will be affected by the elimination of wastewater flows and any subsequent elimination of vegetation in the river. This would be true of all alternatives except the no action alternative. Those species most directly affected will include amphibians such as red-legged frog, pond turtle and water-related bird species including the heron species, the marsh wren and waterfowl species.

All alternative schemes except no action will cause a small reduction in lagoon water surface area during the summer due to the reduced flow in the river. Such a reduction in lagoon area will likely reduce the amount of summertime waterfowl and shorebird habitat, thereby impacting wildlife populations. The degree of this impact is judged to be minor.

During the summer months the lagoon habitat impacts associated with Alternative 134 will be the same as mentioned above. However, the discharge of 20 (anticipated 1980 average dry weather flow) to 87 (ultimate peak wet weather flow) mgd of wastewater into the lagoon during the high flow winter months should be a benefit to wildlife using the area, particularly waterfowl, which are more dependent on winter rather than summer conditions in the lagoon.

The implementation of any of the four major mitigation alternatives proposed will reduce or eliminate the previously mentioned impacts on terrestrial wildlife, and would likely improve habitat conditions in the Salinas lagoon because of the increase in freshwater flows.

Changes in Vegetation Adjacent to Salinas Lagoon. None of the proposed alternatives will likely cause substantial changes in the vegetative cover adjacent to the lagoon. Virtually all of the vegetation in the lower lagoon is salt grass (Distichlis spicata), pickleweed (Salicornia virginica) or other salt-tolerant plant species. Although salinity increases are likely to occur in the lagoon during the low flow months, the impact on vegetation is expected to be insignificant.

The vegetative composition is determined by the salinity of soils and the salinity of water flooding the soils during the spring months. The lagoon is generally open to the ocean during those critical months and tidal waters flowing into the lagoon raise the salinity of the water to the extent that only *halophytes* can exist.

Alternative 134 will add from 20 mgd (projected average dry weather flow of 1980 population) to 87 mgd (ultimate peak wet weather flow) of wastewater into the lower river and lagoon during the high flow winter months. Under normal year conditions, 20 mgd of wastewater would be almost double average December streamflows, would contribute approximately 30 percent to average January flows, 8 percent to February flows and 11 percent to March flows. Such increases in freshwater flow would increase the winter time gradient between fresh and saline water in the lagoon and probably have a positive effect on reducing soil salinities on lands surrounding the lagoon. The higher projected flows for later years will be of an even greater influence.

With a reduction in soil salinities, vegetative composition may change to more beneficial wildlife plants such as fathen (Atriplex patula) and brass buttons (Cotula coronopifolia). These plant species are a better source of food for the water birds that are heavy users of the wetlands in and around the lagoon.

Impacts on Warmwater and Estuarine Fisheries

Reduction of Warmwater Fisheries Habitat. An impact common to all alternatives, except the no action alternative, will be the elimination of existing wastewater discharges to the Salinas River from the present Salinas Main and Salinas-Alisal treatment plants. The elimination of these discharges will reduce existing warmwater fisheries habitat during the low flow months in approximately 5.5 miles of stream. During the normal dry months of May to October or November and in dry years, the two Salinas plants provide 75 percent of the streamflows from the USGS gauging station to the Salinas lagoon, and 90 percent of the flow from the gauging station to the Blanco Drain.

The existing 9-10 cfs (6 mgd) of wastewater is at times adequate to support a warmwater fishery consisting primarily of carp, suckers, and several other species. Periodic fish-kills during the dry season have been observed in the river, probably caused by toxic conditions and low dissolved oxygen. This poor quality of water during the low flow periods is a major limiting factor to the quality of the stream fishery.

The elimination of wastewater flows will also cause a reduction in stream fisheries habitat from the Blanco Drain to the Salinas lagoon. Flows are projected to be reduced by 75 percent to approximately 3 cfs during the low flow months and dry years. Such flow reductions will likely affect resident fish populations by causing a rise in salinity in the upper reaches of the lagoon and by reducing the extent of surface water in the river above the lagoon. Species sensitive to high salt levels will have to move further upstream in the lagoon. Total numbers of fish in the river itself will decrease due to the reduced size of the surface water habitat.

The reduction of flows is not expected to affect upstream movements of steelhead trout, since the migrations are primarily dependent on adequate downstream flows for the total length of the Salinas River, not just flows below Spreckels. The winter upstream migration is supported by normal winter streamflow accretion (from rainfall) and by a 10 cfs release from Nacimiento Reservoir made by the California Department of Fish and Game through a working agreement with the City of San Luis

Obispo. *Anadromous fish* cannot navigate the Salinas River until these sources of water create adequate surface flows in the entire length of the river. Neither San Antonio nor Nacimiento Reservoirs have their own winter flow release programs for anadromous fish (Jones & Stokes Associates, Inc., 1976).

The greatest impact on warmwater fisheries will occur during the months of June through October when streamflows are at the lowest point. Flows during the remaining months should be adequate to provide fishery habitat from Spreckels to the lagoon even in the absence of wastewater flows.

The regionalization of wastewater systems proposed in all alternatives will also eliminate existing wastewater flows from the Castroville Sanitary District's plant to Tembladero Slough. These flows amount to 0.34 mgd (0.5 cfs) and represent only a small percent of flows in the slough. The impact of flow elimination on fishlife is expected to be insignificant.

As was mentioned earlier, the two Salinas sewage treatment facilities represent the only point source discharges to the Salinas River in the study area above the Blanco Drain. However, it is likely that nonpoint sources contribute some water to the river. These flows may originate or be influenced by: 1) the El Toro Park Estates sewage treatment facility, 2) Spreckels percolation ponds, 3) the Salinas industrial percolation ponds, and 4) irrigation return flows from agricultural operations adjacent to the river. All of these sources will likely continue to provide some water to the river, either as underflow or surface flow. Upon termination of the Salinas wastewater discharges, these nonpoint sources will represent the only sources of water to the river from Spreckels to the Salinas lagoon.

A number of possible mitigation schemes have been identified for the maintenance of both summer streamflows and the warmwater fishery in the lower Salinas River and the Salinas lagoon. The four methods considered most feasible include: 1) retention of a direct river discharge by the City of Salinas (from existing plant); 2) pumping effluent from the regional facility back to Salinas and discharging into the river during the summer months; 3) developing a wellfield and diverting pumped groundwater to the river; and 4) releasing additional quantities of water from Nacimiento or San Antonio Reservoir.

Maintenance of direct river discharge by the City of Salinas would ensure that existing habitat was maintained since summer discharge volume would be the same as present. For all other alternative schemes, the question of water quantity would require calculation and legal agreement (see Significant Issues to be Resolved section). All of these mitigation schemes would maintain the 5.5 miles of stream fishery habitat now maintained by the 6 mgd of wastewater from the existing treatment plants. Such mitigation measures would totally or partially offset projected impacts (depending on quantity and quality of flow to be released) on terrestrial wildlife and vegetation and warmwater and estuarine fisheries expected with Alternatives 1, 166, 170 and 171.

The negative aspects of maintaining a Salinas wastewater plant discharge are: 1) the necessity of maintaining a wastewater treatment plant in Salinas; 2) the failure to eliminate all wastewater discharges (and their health problems) to the river; and 3) the reduced volume of reclaimed wastewater that would be available for crop irrigation through the regional system.

There are no major environmental benefits in using flow augmentation from effluent piped upstream from the new regional plant when compared to the other options, except that the existing Salinas treatment plant could be eliminated. This would eliminate the local aesthetic and occasional nuisance odor problems caused by the treatment plants in Salinas. The adverse environmental implications of this mitigation method include the need for construction of an additional pipeline from the treatment plant and a reduction in reclaimed wastewater being provided to an irrigation reuse system (assuming an irrigation reuse option is selected). The pipeline construction would create short-term impacts along the pipeline route; the significance of the impacts would fluctuate with the route chosen. The decrease in reclaimed wastewater being provided to irrigation would reduce the benefits reclamation might have on the local water supply and salt water intrusion problems.

Pumping groundwater to maintain dry-weather flows in the lower Salinas River would have several benefits. First, long pipelines and additional treatment facilities would not be needed to provide the flow. The location of the facility could also be quite flexible. The existing Salinas treatment plants could be eliminated, and the area could tie into the regional wastewater system. In addition, the flow source would be of a fairly constant and reliable volume and quality. There would be no possibility of accidental discharges of toxic materials to the river.

The use of groundwater for flow augmentation carries with it several potential problems. The 180- and 400-foot aquifers in the Salinas Valley are presently being overdrafted and intruded by salt water. Additional pumping from these aquifers will increase these problems. However, if the surface aquifer, which is seldom used due to its relatively high mineral content, could be used as a source for flow augmentation, the pumping should have little effect on usable groundwater supplies.

Flow augmentation from increased upstream reservoir releases would allow Salinas to tie into the regional wastewater system, thereby eliminating the existing Salinas treatment plants and providing the maximum reclaimed water flow to irrigation should an irrigation option be selected for the regional wastewater disposal system. The quality of the dry-weather surface flow in the lower river would also be greatly improved over existing conditions. No pipelines, pumps or treatment facilities would be required beyond those for the regional treatment and disposal.

The shortcomings of this option relate to its operational, legal and political feasibility. There should be no adverse environmental effects. The operational feasibility of additional releases from the upstream reservoirs should be investigated in cooperation with the Monterey County Flood Control and Water Conservation District and the State Water Resources Control Board.

The allowance for a discharge into the California Department of Fish and Game wildlife area at the mouth of the Salinas River would represent a means of partially mitigating for impacts on wildlife upstream if none of the four aforementioned instream release mitigation alternatives were implemented. Such a discharge would have the potential of improving the quality and increasing the quantity of marsh habitat. Quality of the wastewater discharge may have to meet the SWRCB and EPA standards for contact recreation use, as the wildlife area is open to the general public for hunting and fishing. The quality requirements should be further investigated prior to implementing this mitigation measure. Any of the project alternatives (except no action) could initiate such a discharge to the wildlife area, but some means of conveyance from treatment plant to marsh would be necessary. Alternatives 1 and 166, with ocean outfalls passing through or near the wildlife area, would be most suited for instigating this mitigation.

Effects on Fisheries Resources of Elkhorn Slough or Moss Landing Harbor. The regionalization of wastewater systems proposed in all alternatives (except no action and Alternative 134) will eliminate all wastewater flows now entering Elkhorn Slough and Moss Landing Harbor from Tembladero Slough and from the Old Salinas River.

The elimination of wastewater flows to Elkhorn Slough will improve the quality of habitat for estuarine fish and shellfish, particularly in those areas now greatly impaired by pollutants. The reduction in freshwater or brackish water flows to Elkhorn Slough and Moss Landing Harbor will have an insignificant effect on the fish resource.

Under the no action alternative, impairment of estuarine fishlife in Elkhorn is expected to continue.

Alternative 134 (irrigation and lower Salinas River or lagoon disposal) will cause an increase in flows in the Old Salinas River and into Moss Landing Harbor during the spring, winter and fall months in the early years of operation. Summer flows are not expected to increase significantly during the summer irrigation period unless the decision is made not to use wastewater for irrigation. In later years (2000) the expected increases in wastewater volume may go beyond the needs for irrigation and flows may then increase during the summer months.

Such flow increases may change fisheries habitat in portions of Elkhorn Slough and Moss Landing Harbor by creating a salinity gradient. This situation may cause a reduction in the marine organisms and a shift to the more freshwater-tolerant species. This entire impact could be negated, however, if the decision was made to close the tide gate between the Old Salinas River channel and Elkhorn Slough, thereby eliminating freshwater flows into the harbor.

The implementation of any of the four major mitigation measures mentioned earlier would reduce the impacts on fisheries resources of Elkhorn Slough by continuing freshwater flows into the Salinas lagoon and Old Salinas River. Those flows would not be equivalent to existing flows entering Elkhorn Slough from Tembladero Slough and Old Salinas River.

Changes in Estuarine Fisheries Habitat. The elimination of wastewater flows from the two Salinas sewage treatment plants will create changes in the low flow condition of estuarine fisheries habitat in the Salinas lagoon. This total elimination of wastewater would occur with Alternatives 1, 166, 170 and 171. Alternative 134 (irrigation and lower Salinas River or lagoon disposal) would provide tertiary treated wastewater to the lower Salinas River and lagoon. Under present conditions, sources of water to the lagoon include sewage wastewater, annual runoff from the Salinas River watershed, agricultural return water, salt water from Monterey Bay and water from several nonpoint sources.

These sources of water have varying influences on the quality of the lagoon water throughout the year. The size and diversity of the estuarine fishery is dependent greatly upon the quality of the lagoon water. Water quality dictates the range of species present and the relative number of individual fishes to be found. In general, when turbidity and temperature increases and dissolved oxygen levels decrease, the range of species and number of individuals decreases. During the low flow months, lagoon water quality is poor, with algal blooms, oxygen depressions and toxic conditions commonplace. The TDS and specific conductance of the water during that time is dependent on the amount of freshwater inflow from agricultural water and sewage effluent and from the tidal conditions.

The elimination of sewage flows will likely cause a reduction in the extent of the ponded areas during low flow months. This impact would be common to all alternatives assuming that wastewater is utilized for irrigation. Such flow reductions will probably cause an increase in the TDS and specific conductance of lagoon water during the low flow summer months since under present conditions the sewage effluent tends to dilute the more saline agricultural wastewater and intruded Monterey Bay water. The increases in salinity will reduce the habitat for freshwater fish species and improve the habitat for marine and estuarine fish species.

The effect of eliminating sewage flows on fishes during the high flow winter months will be negligible even though all alternative schemes except Alternative 134 will eliminate those flows. This minor impact is due to the fact that during the winter months normal stream accretion and reservoir releases provide improved habitat and sufficient water in the lagoon (Department of Water Resources, 1965). During periods of high flows, Alternative 134 will discharge tertiary-treated wastewater (level III or level V) into the lower Salinas River or lagoon. If Alternative 134 discharges to the lower river in periods of low flow, these discharges should decrease the TDS and electrical conductance of the water in the lagoon and improve the habitat for warmwater and anadromous fish.

Impacts on Monterey Bay Biota

At this time the exact location of possible ocean outfall is yet to be determined and the predesign study of the possible impact of an ocean outfall on the marine environment is therefore in abeyance. However, several possible routes for the line and locations for the outfall in Monterey Bay have been proposed (Figure 32). Four possible routes have been considered; all of them would enter the bay just south of the mouth of the Salinas River, and the outfall would be located between the 60- and 100-foot contours. Available information suggests little difference between the outfalls proposed for these four alternative routes as far as potential impact on bottom fauna and plankton is concerned, and the selection of a final approved route will probably be governed more by length of pipe and problems of routing across land, dune fields and marsh areas, and highway and rail line crossings. The four suggested outfall sites would, as indicated, be at about the same depth. They were originally located along the 120-foot contour and spread over an 8,500-foot stretch. Alternatives 1 and 4, however, ended at about the same location in the bay; outfall 2 was about 4,000 feet south of these, and the last, Alternative 3, was situated south of these, and the last, Alternative 3, was situated 4,500 feet south of #2. Subsequent engineering work has resulted in Engineering Science, Inc. recommending use of route 2, but with a significantly shorter route and shallower terminus. Pending a more detailed study of current patterns in this area, it would seem better to consider the outfall sites farthest from the river mouth as potentially the least likely to cause problems. This is simply in view of the potential silt load and possible storm drain overflow of materials from the Salinas River during periods of high rainfall, which might augment the effect of the proposed ocean discharge. It is proposed that the outfall line would be in a deep trench, emerging at about a depth of 30 feet in the bay, and covered from that depth out to the end of the pipe. The surface would be covered to a sloping contour with rocks and sand, thus reducing the possibility that it would act as a barrier to movement of benthic and demersal organisms moving about in the vicinity of the pipeline.

Secondary treatment is proposed for this combined discharge, which would produce effluents of the quality indicated as level 1A (Table K-1). This treatment would reduce total coliform counts to 1,000 MPN/100 ml. Other than meeting public health requirements, the significance of this level of coliform bacteria to marine organisms is as yet inadequately understood. Some marine organisms, including oysters, thrive in what are polluted environments, according to public health standards. This treatment level does not, however, remove many of the other constituents of wastewaters such as those indicated in Table K-2 under "other data". With respect to trace metals, the concentrations in the wastewater generally exceed those in ocean water, (see Table 40). The initial 100 to 1 dilution the wastewater is supposed to receive upon entering the ocean should slow trace metal buildup in the immediate vicinity of the outfall, spreading it over a fairly large area.

The effect of trace metals on marine benthic invertebrates is not well established. Studies conducted in the Southern California Bight indicated there was no apparent increase in trace metal concentrations in invertebrates living in sediments with high metals concentrations. Nor was there an increase in metals concentrations in fish that were feeding on these invertebrates (Southern California Coastal Water Research Project, 1973).

The effects of the new discharge on fisheries is also difficult to assess. There would probably be a change in fish populations and species diversity in the immediate vicinity of the outfall. Those species tolerant to or attracted by the freshwater source will remain in the area, while other less-tolerant species will move away. The net result would be a decrease in diversity with possibly an increase in numbers of certain species. No estimates are available on the possible size of the zone of effect, but it is likely to be extremely small, as there is expected to be considerable dilution of the effluent. The outfall should have little or no influence on the overall distribution of fish in the bay. The species commonly caught in the area are rockfish, halibut, sand dabs, white croaker and salmon.

In the analysis of ocean outfalls in southern California, it appeared there was a correlation between wastewater discharges and a fin erosion disease in several species of fish. The causal factors of the disease were unknown, however, and the effluent discharging to the area received only primary treatment (Southern California Coastal Water Research Project, 1973). The predesign oceanographic survey and post-project monitoring requirements of the SWRCB and RWQCB are designed to identify potential hazards to marine life so that remedial action can be taken. This could include relocation of the outfall site, change in level of treatment, or selection of a different disposal method. These survey and monitoring requirements are also designed to establish a baseline against which changes due to the ocean discharge can be measured.

One benefit of a diffuser system outfall is the development of growths of benthic invertebrates on the outer surface of the exposed end of the pipe. This is brought about by a sort of micro-upwelling, or entrainment of nearby water by the rising effluent. This is not, of course, a direct response to the quality of the effluent, but to the mechanical process set in motion by the effluent water, although this confusion is evident in some popular explanations of the development of epifauna on outfall pipes.

Impacts on Land Use

Conflicts with Adjacent Land Uses. Many of the project's impacts on land use are associated with construction of facilities and the indirect stimulus of growth. These impacts are discussed in other sections of the report. Operation of wastewater facilities generally affects only those lands adjacent to treatment and disposal/reuse sites. All of the proposed treatment plant sites are located in open space/agricultural areas. Their use would have little effect on existing adjacent uses.

Facilities located on Sites 1, 4 and 5, and urban expansion of the City of Marina, could eventually come into conflict. This could be avoided by selecting one of the other treatment plant sites or by using part of the garbage and refuse disposal site in the northeastern part of Alternative treatment plant Site 4. It is unlikely that urban development will encroach on this area.

The storage reservoirs needed for Alternatives 134, 166, 170 and 171 would probably be located on treatment plant Site 4. This would also conflict with urban expansion planned by Monterey County (1967) for the area unless the reservoirs could be confined to the landfill property. Selection of a nonstorage wastewater system would avoid this impact. There appear to be no other feasible sites for storage areas in the vicinity, so relocation to avoid the impact is not likely. A possible conflict could also be avoided if the county would allow only compatible land uses (i.e., agricultural, industrial) to occupy the land within Alternative Site 4.

Impacts on Public Services and Facilities

Water Supply.

The operational impact of the proposed regional wastewater system on the size of the local water supply was described in an earlier section. The following impact relates to the provision of water.

Relocation of the Area's Reclaimed Water Sources. All of the proposed project alternatives will relocate the treatment of north Monterey County's domestic wastewater to a single location near the mouth of the Salinas River. The proposed location for the regional plant facilitates the supply of treated wastewater to farming operations near Castroville. This appears to be the best single place to eventually reuse all of the area's wastewater, thereby having the most beneficial impact on the regional water supply situation. Communities and individuals drawing water from the Salinas River groundwater basin would receive the benefit.

This relocation could preclude wastewater reuse in the Monterey Peninsula and adjacent coastal areas, which are also experiencing local water supply problems. These areas may not be able to benefit their own domestic water supply situations by supplying existing nondomestic uses (golf course and park irrigation, noncontact recreational lakes, etc.) with wastewater. This could be remedied by maintaining local treatment plants or installing small package plants to treat part of the local waste flow even after construction of the regional system. The Monterey Peninsula cities are already investigating this possibility. The water supply benefit could also be shared by negotiating a water rights exchange. Portions of or all of the Castroville Irrigation District's rights to Nacimiento and San Antonio Reservoir water could be transferred to other entities in exchange for the reclaimed wastewater. Some or all of the extra reservoir releases planned as part of the Castroville Irrigation Project could be diverted to other areas (the peninsula or coast) for domestic use rather than the Castroville Irrigation District for agricultural use. The legal, political and operational feasibility of a water rights swap has not yet been thoroughly investigated.

Liquid Waste Treatment and Disposal.

Centralization of Liquid Waste Treatment and Disposal. As stated above, all of the alternatives will combine north Monterey County wastewater treatment and disposal to a single system under a single wastewater agency. This will remove the responsibility of providing the service from the incorporated cities involved, from Ft. Ord, and from the existing county sanitation districts within the service area. Local jurisdictions will probably be responsible only for maintaining the internal wastewater collection systems. This should improve the efficiency of liquid waste management in the area.

Elimination of Eight Local Wastewater Treatment Facilities. All of the proposed alternatives would eliminate the need for eight existing wastewater facilities, including two at Salinas, and one each at Pacific Grove, Monterey, Seaside, Ft. Ord, Marina and Castroville. The abandoned plants may be razed and their various parts salvaged, or they may continue to treat small flows for local reuse (golf course or landscape irrigation, recreational water). They could also be converted to other uses.

The regional system could also eventually replace a number of small privately-owned and operated wastewater systems (Tables J-7 and J-8). This will depend upon the ability of the private plants to meet the 1977 and 1983 discharge requirements of PL 92-500 and RWQCB policy.

Operational Reliability of Liquid Waste Treatment Processes. Although all secondary and tertiary processes being considered have been installed and operated satisfactorily at numerous other locations, it can be generally stated that the more complex and greater in number are the treatment processes utilized, the lower the overall system reliability. Also, the less an alternative relies on intermediate pumping in the treatment process, the higher is the operational reliability. Based upon these criteria, Alternatives 1 and 171 provide a high, and essentially the same, treatment reliability. The remaining three alternatives provide the same level of tertiary treatment, but 134 and 170 require pumping of partially-treated wastewater to intermediate storage. Based upon these considerations, it appears that the treatment process reliability of the alternatives ranks as follows (from most to least reliable): 1, 171, 166, 170 and 134.

Operational Reliability of Disposal Facilities. All of the alternatives are capable of meeting the existing and proposed waste discharge requirements. However, the various wastewater disposal modes being considered have varying abilities to provide an environmentally safe means of disposing of untreated waste should the treatment process be interrupted for some reason. Those alternatives with sealed storage or flow regulation reservoirs (Alternatives 134, 166 and 170) can provide a reliable, safe disposal location in emergencies of short duration. Disposal to the ocean (Alternative 1) or to percolation ponds (Alternative 171) is less desirable, as water quality would be degraded and public health hazards could result. If plant malfunctions or shutdowns of long duration occur, none of the possible disposal modes would be completely acceptable. There does not appear to be a significant difference in disposal reliability in this latter regard.

Dependence on an Agricultural Irrigation Distribution System. Although four of the five alternatives are dependent on an irrigation distribution system for wastewater reuse, it must be recognized by the reader that the only system in the planning stage is the Castroville Irrigation Project (CIP). In order to make the CIP economically feasible, a 4-3/8 percent interest rate loan on 35 percent of the project and an interest free loan on the remaining 65 percent of the project is required from the U. S. Bureau of Reclamation. This loan has been applied for but to date has not received approval. In addition, the CIP must be approved by the Monterey County Board of Supervisors. Since Alternative 1 does not require construction of an irrigation distribution system, it is not affected. Although Alternatives 134 and 166 each have a means of disposal other than irrigation, deletion of this reuse from these alternatives change 134 into a total river disposal alternative that might require a higher summertime level of tertiary treatment (level V as contrasted to level IV) and Alternative 166 would be changed into Alternative 1, with deletion of the requirement for tertiary treatment (level IV). Thus, two alternatives (170 and 171) are totally dependent on an irrigation project, two others (134 and 166) become totally different alternatives if irrigation is not implemented, and Alternative 1 is not affected by irrigation proposals.

This reliance on the CIP or some other project can be eliminated if construction of an irrigation distribution system is made part of the reclamation alternatives (134, 166, 170 and 171). The total cost of these alternatives would be increased, but irrigation reuse could be implemented regardless of the status of other projects. The location of the irrigation system could also be selected independently of other projects. Other reuse options could also be investigated to avoid reliance on a major agricultural irrigation system. These are discussed in some detail in the Alternative Projects section.

Potential Discharge of Septic and Untreated Wastes Should an Employee Strike, a Major Equipment Malfunction or Other Unforeseen Events Occur. In general, the more sophisticated the treatment process and/or the more the system depends on pumping, the greater the possibility of an adverse impact due to a major equipment malfunction, a power outage, or an employee strike. All pump stations must be designed with standby pumping capabilities and standby power generating capability to be utilized in the event of the failure of any of the installed equipment or a disruption in normal power supply. Thus, a major malfunction of pumping equipment would not put a pumping station completely out of operation. The treatment facility must also have standby power generating facilities capable of operating the plant in the event of a complete power outage.

Those alternatives which employ tertiary treatment (134, 166, 170 and 171) and/or intermediate pumping to storage (134 and 170) would be most susceptible to an employee strike. This is not to suggest that activated sludge secondary treatment is easy to operate, but only that it would be easier for supervisory personnel to operate during a strike than a more complex tertiary plant.

Change in Personnel Requirements to Operate Facilities. At the present time, 42 people are required to operate the 8 existing treatment facilities. Implementation of the various proposed alternatives would alter the wastewater treatment personnel requirements somewhat. Engineering Science, Inc. (pers. comm.) has estimated that a minimum of 33 personnel would be needed to operate Alternative 166 facilities in its initial year of operation (1981-1982). This includes 1 person for each of the pump stations. Exact requirements for the other alternatives have not been calculated, but generally speaking, the more sophisticated the treatment facility the higher the personnel requirement. Alternatives 134 and 170 would probably have requirements similar to Alternative 166. Alternatives 1 and 171 may require slightly fewer operators.

Solid Waste Disposal.

Sludge Production and Disposal. The sludge which would be produced can be divided into two categories: 1) digested and partially dewatered primary/secondary sludge; and 2) dry, recalcined lime sludge from tertiary treatment. The dried, digested primary/secondary sludge would be identical in quantity in all alternatives. This sludge makes an excellent soil conditioner, and every effort should be made to utilize it on city parks and other public areas, as well as agricultural land. If such uses cannot be developed to utilize the entire amount produced, the excess sludge would be trucked or piped to the Marina sanitary landfill (a Class II landfill with a 50-70 year useful life). The sludge production should range from approximately 41,610 tons per year in 1990 to 46,415 tons per year in the year 2000 (assumes 8,770 pounds of wet sludge per mgd).

Tertiary sludge would be produced in Alternatives 134, 166, and 170. The sludge produced is a dry, recalcined lime material which would be reused or transported to the Marina landfill. The quantity produced is dependent on the amount of flow processed by tertiary treatment, the expected quantities being shown as follows:

	Tons/Year	
Alternative/Year	1990 (25.41 mgd)	2000 (29.28 mgd)
134	5,496[1]	6,333[1]
166	5,496[1]	6,333[1]
170	9,553[2]	11,004[2]

[1] Assumes tertiary treatment for 7 months of the year with a tertiary sludge production of 2,060 pounds/mgd (Battelle Memorial Institute, 1974).

[2] Assumes tertiary treatment of all wastewater with a sludge production of 2,060 pounds/mgd.

Power.

Increased Energy Consumption in Collection, Treatment and Disposal of Domestic Wastewater. Table 33 in the Alternative Projects section lists the expected electrical energy requirements of the project alternatives. These consumption rates represent an increase over existing rates, primarily in raw effluent pumping and advanced wastewater treatment. Currently, seven of the major wastewater treatment systems in the study area are using about 12,000,000 Kwh per year for collection and treatment of wastewater. This excludes Ft. Ord, as numbers were not available for their system. The regional system proposed by the project engineers (Alternative 166) would utilize 14,693,000 Kwhs per year for major interceptor transport and treatment. This does not include energy used for pumping in the local collector systems. Even though an exact increase cannot be estimated, it is apparent that the new regional treatment system would use considerably more electrical energy than present systems.

In all alternatives, the influent sewage pumping requirement is identical. The principal deviation in energy requirements results from the need for tertiary treatment and effluent pumping in some alternatives. Alternative 1 requires only slightly more energy than no action would, and is the least directly consumptive of any viable alternative. Alternative 171 requires slightly more energy than Alternative 1, and Alternatives 166 and 170 require slightly more than Alternative 171. The Alternative 134 requirement is substantially greater than all of the others. The tertiary treatment alternatives require natural gas to recalcine lime sludge produced in coagulation, and the no action alternative requires gas for incineration at the Monterey plant. (The projected energy consumption figures used in this comparison have not been adjusted to reflect the proposed use of methane to run regional treatment plant facilities. They represent total energy requirements.)

These demand increases should have no direct effect on the supply of power to local residents, businesses or industries. There are numerous mitigation measures capable of reducing the system's power demands, however.

The methane gas generated by sludge digestion at the regional wastewater treatment facility is to be used as fuel to heat the sludge digestors. The rural location of the probable treatment plant site does not facilitate supply of the plant's excess methane for home or industrial heating. It may be used to run other plant systems, however. If alternative treatment plant Sites 4 or 5 are used for the regional facility, it may be possible to tie the plant's excess methane into the proposed methane recovery system at the adjacent Marina landfill. The Monterey County Solid Waste Management Plan (Munson, 1976) anticipates that an active methane recovery program will exist at this landfill site sometime between 1990 and 2000. The possibility of supplying the combined treatment plant-landfill methane to PG&E should be investigated as another option. In the interim, other treatment plant uses for excess methane should be encouraged.

The electrical consumption of the system as a whole can be kept to a minimum by selecting those interceptor, treatment plant location, and treatment and disposal alternatives with the lowest expected energy requirements. Energy-efficient pumps and motors should also be utilized. Selection of the most energy-efficient system may require undesirable environmental trade-offs, however. The treatment plant locations investigated in detail were selected primarily on the basis of land availablity, adjacent land uses and probable location of disposal or reuse. The treatment and disposal methods being investigated are designed to meet state and federal water quality and public health requirements. These considerations may outweigh possible energy saving from other locations or types of systems. Nonetheless, electrical energy must be considered in this environmental evaluation as a nonrenewable resource with limited supply, as the fuels consumed to produce the energy are of a nonrenewable nature (i.e., natural gas, fuel oil).

Aesthetic Impacts

Possible Elimination of Eight Existing Treatment Plants. All of the proposed project alternatives would eliminate the eight major wastewater treatment plants in the study area. Many people find such facilities to be aesthetically undesirable and therefore their removal is generally considered beneficial. This is especially true where the facility is near residential or recreational areas. Dismantling of the coastal plants and their ocean outfalls (Pacific Grove, Monterey, Seaside, Ft. Ord, Marina) would enhance the scenic value of the Monterey Bay coastline and the nearshore waters of the bay. Removal of the two Salinas plants would improve the scenic qualities of both developed (Alisal plant) and developing (Salinas main plant) parts of the City of Salinas. Elimination of the Salinas plant river discharges would reduce the noxious odors and algae blooms that occur below the outfalls in periods of low river flow, improving the scenic and recreational value of the Salinas River. From another viewpoint, elimination of discharge, which could result in a total lack of flow in the lower stretches of the river during dry periods, would reduce the aesthetic value of the river. Dismantling of the Castroville plant would remove treatment structures from a predominantly open, agricultural landscape.

Introduction of a Large Wastewater Treatment Facility into a Predominantly Open Landscape. Each of the five project alternatives includes a single, large wastewater treatment facility near the mouth of the Salinas River. This area is presently open land supporting agricultural pursuits, solid waste landfilling, and a limited amount of recreation. The six treatment plant sites being considered are in close proximity to one another, but have varying degrees of visibility to passers-by and therefore slightly different potential visual impacts. The treatment facility itself will occupy 40 to 50 acres of land. If placed on Sites 1, 2, 3 or 6, it would be readily visible from both the present and new routes of State Highway 1. This section of highway is included on the state's scenic highway master plan, but has not yet been officially designated as a scenic route. A treatment facility on Sites 4 or 5 could be placed so that only persons driving along the Marina landfill access road might see it. If constructed on Site 4 adjacent to the landfill, the treatment plant would have little effect on the area's aesthetic quality.

Use of low profile structures, subdued natural colors and construction materials, and sufficient landscaping could reduce the visual impact of the treatment plant complex. Construction of a low berm around the facility would also minimize the impact.

Storage reservoirs planned as part of Alternatives 134, 166, and 170 and percolation-infiltration ponds required for Alternative 171 would be located in the rolling terrain of alternative treatment plant Site 4. The water level in these facilities would be subject to extreme variation and the ponds may at times be dry. This altered landscape might be considered aesthetically unpleasing to some people, although tree planting and shrubbery on the perimeter could substantially lessen the impact.

If urban development expands northward from the new City of Marina in the future, aesthetic problems associated with the regional wastewater treatment facility may be greatly increased. Residential and commercial interests are frequently allowed to encroach upon aesthetically detracting areas until complaints from occupants force curtailment or removal of the earlier established use. Once the regional treatment facilities are located and constructed, land use plans and zoning in the area should be structured to avoid such a conflict.

Resource Use

Chemical Consumption. Chemical requirements for the treatment and disposal alternatives are shown in Table 34. All alternatives have been described as using chlorine for disinfection and all in essentially the same quantity, except Alternative 1, which requires less disinfection prior to discharge to the ocean. Other methods of disinfection have been considered; they are described in the Alternative Projects section of this report. The three alternatives requiring tertiary treatment (134, 166 and 170) require lime or alum as a coagulant; therefore, they have a higher yearly consumption of other chemicals when compared to the secondary systems of Alternatives 1 and 171.

Chemical consumption can be reduced by using other treatment and disinfection methods. Ozonation, when used as a substitute to conventional tertiary wastewater treatment, can cut coagulant (lime or alum) and disinfectant (chlorine) requirements significantly. Small-scale prototype ozonation tests conducted by James M. Montgomery, Consulting Engineers (1975) indicated alum dosage could be cut from 140 mg/l to 10 mg/l and chlorine dosage from 8 mg/l (post-filtration) to 2 to 4 mg/l when substituting an ozonation-coagulation-flocculation-filtration-chlorination treatment train for the standard chemical coagulation-sedimentation-filtration-chlorine disinfection process. The large-scale effectiveness of ozonation is not yet well-documented, however, and it requires a large energy input. The energy consumed in producing chlorine (3,000 Kwh/ton [California State Water Resources Control Board, Energy Task Force, 1974]) and coagulant would be reduced if ozonation were used. The savings on chlorine production alone could range from 456,600 to 684,900 Kwh per year in 1980. This must be balanced against the additional energy needs for the ozonation process itself, however. No specific estimates have been prepared for this contingency in Monterey County, but in a similar wastewater project in Chino, California, energy consumption at a 24 mgd plant was expected to more than double if the conventional tertiary treatment processes were abandoned in favor of ozonation (Jones & Stokes Associates, Inc., 1975).

Land treatment and ocean disposal options would reduce chemical consumption when compared to the tertiary treatment alternatives. Use of land treatment would eliminate the alum or lime requirement and ocean disposal would reduce the chlorine requirement (see Table 34). Some forms of radiation are also used as disinfectants. Particle, electromagnetic and acoustic radiations have been used to sterilize water, but usually on a small scale. These methods eliminate the need for chemical additives, but require additional sophisticated equipment not normally used in wastewater treatment plants.

Electrical Energy Consumption. The electrical energy requirements of the various interceptor routes and treatment and disposal processes are listed in Table 33. Additional discussion and listing of mitigations is included under "impacts on Public Services and Facilities-Power".

Noise Impacts

Local Increase in Noise Near Pump Stations and Treatment Plant. All five of the project "action" alternatives (1, 134, 166, 170, 171) would require operation of several pump stations along the new wastewater interceptors and a new regional treatment plant. New pump stations would be located near the Seaside treatment plant at Aldy Way, near the intersection of Reservation Road and State Highway 1 in Marina, and at Nashua Road near State Highway 1, just south of Castroville. Existing structures would be used to house pumps at the Monterey, Salinas main and Castroville treatment plant sites. All of the pumps would be run by electrical motors which would be in operation at all hours. Noise levels generated by unenclosed electrical pumps vary greatly with the type and size of pump and no estimates of probable levels were found. Backup pumps run by gas driven internal combustion engines would probably produce noise in the 65 to 75 dBA range at 50 feet (U. S. Environmental Protection Agency, 1971) if unenclosed. (Figure 39 lists typical sound levels and human responses for comparison with these dBA estimates). It is expected that the new pump stations would be constructed underground and the pumps at Monterey, Salinas and Castroville would be in existing structures. The noise from the pumps should therefore be sufficiently insulated to avoid any significant impact on adjacent human or wildlife inhabitants.

The variety of pumps, engines and other mechanical equipment used at the new regional treatment plant site would also generate noise. It is difficult to predict the eventual noise levels generated by the fully operating plant, but if

Figure 39

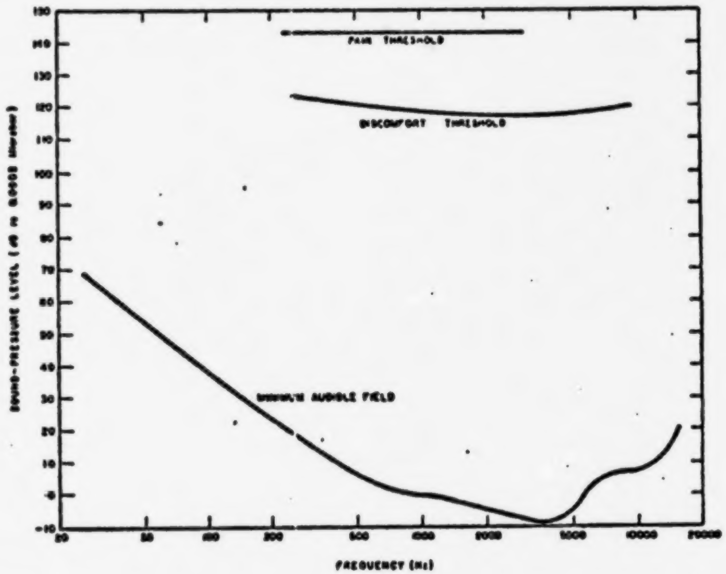
HUMAN TOLERANCE AND RESPONSE TO SOUND LEVELS

Weighted Sound Levels and Human Response [1]

Sound Source	dB (A)*	Response Criteria
	150	
Carrier Deck Jet Operation	140	
		Painfully Loud
	130	Limit Amplified Speech
Jet Takeoff (200 feet)	120	
Discotheque Auto Horn (3 feet)		Maximum Vocal Effort
Riveting Machine	110	
Jet Takeoff (2000 feet)		
Shout (0.5 feet)	100	
N.Y. Subway Station		Very Annoying
Heavy Truck (50 feet)	90	Hearing Damage (8 hours)
Pneumatic Drill (50 feet)		
	80	Annoying
Freight Train (50 feet)		
Freeway Traffic (50 feet)	70	Telephone Use Difficult
		Intrusive
Air Conditioning Unit (20 feet)	60	
Light Auto Traffic (50 feet)		
	50	Quiet
Living room		
Bedroom	40	
Library		
Soft Whisper (15 feet)	30	Very Quiet
Broadcasting Studio	20	
	10	Just Audible
	0	Threshold of Hearing

*Typical A—Weighted sound levels taken with a sound-level meter and expressed as decibels on the scale. The "A" scale approximates the frequency response of the human ear.

THRESHOLDS OF HEARING AND TOLERANCE [2]



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[1] U. S. Council on Environmental Quality. 1970. Environmental Quality. The First Annual Report of the Council on Environmental Quality. 326 pp.

[2] Benarde, Melvin A. 1970. Our Precarious Habitat. W. W. Norton & Co., Inc., New York. 362 pp.

pumps and engines are adequately housed and dampened, levels should not exceed the 45 to 55 dBA range. All of the proposed treatment plant sites are sufficiently remote from residential and recreational areas to eliminate the likelihood of serious off-site noise complaints. The plant's internal noise could be kept to a minimum by vibration isolating pumps and motors, installing acoustical filters designed for specific pumps and motor speeds, and enclosing pump and drive units in acoustical enclosures (U. S. Environmental Protection Agency, 1971a).

Noise Reduction in the Vicinity of Abandoned Plants. Noise levels in the vicinity of abandoned treatment plants would decrease slightly. The impact would be quite minor, but operational noise at the Marina, Ft. Ord, Salinas-Alisal and Seaside plants should cease. Pumps would remain in operation at the Monterey, Salinas main and Castroville plants, but other operational equipment would no longer be used.

Flood Hazard

The U. S. Geological Survey (USGS) mapping of flood-prone areas within the study area was conducted on a general level. Before the specific flood threat can be identified and declared official for flood insurance purposes, the U. S. Army Corps of Engineers must review and verify the USGS mapping. This has been done within the Cities of Salinas, Monterey and Seaside, but not within the remainder of the study area. This impact analysis is therefore general in nature and should be re-evaluated when the detailed mapping is complete.

It appears that there is no flood threat to any proposed wastewater facility specifically designed for one project alternative. Those facilities planned within the flood hazard area (as currently mapped) are interceptor pump station facilities common to all project alternatives. The interceptors from both Salinas and Castroville must cross flood-prone areas. The Salinas line crosses the Salinas River floodplain while the Castroville line crosses the floodplains of Tembladero Slough, Alisal Slough and the Salinas River. If properly constructed and buried, there should be no significant threat of flood damage to those lines. There are no feasible alternative interceptor routes that would avoid a crossing of the mapped flood-prone areas.

The proposed Castroville sewage treatment plant pump station (see Figure 30) is located within the flood-prone area mapped along Tembladero Slough. A low berm exists around a portion of the Castroville treatment plant, but it is not known what degree of protection this affords.

A more detailed analysis of the flood threat at this site should be conducted prior to final design of the interceptor system. If it is within the 100-year floodplain, steps must be taken to protect the proposed pump station from flood flows. Construction of a berm may be sufficient. If not, it may be necessary to relocate the pump station to a higher elevation. The federal government will not fund facilities proposed within the officially-designated 100-year floodplain unless given assurances that they can be protected from flooding.

Economic Impacts

Service Costs

The following economic impact analysis focuses on the alternative recommended in the Facilities Plan (#166), as a detailed revenue plan has been developed for this alternative by Bartle Wells Associates (1976). The other project alternatives would have similar types of impacts, but the dollar amounts would vary with the difference in construction and operation costs (see Table 27).

Financing the Cost of the Project. The direct economic effect of the proposed project is its cost, estimated at $71,400,000 for the alternative recommended in the Facilities Plan (at the time of construction in 1980). Of this, the local share would be about $10 million, with the difference financed by federal installations in the area ($9.5 million) and federal and state grants.

Financial consultants to the MPWPCA (Bartle Wells Associates) have recommended that a regional county sanitation district be formed. This agency would call a bond election to authorize the sale of bonds for financing local capital costs. Either revenue bonds (which require authorization by a simple majority vote in a bond election) or general obligation bonds (which require a two-thirds majority vote) would be acceptable alternatives, according to the financial consultant. To finance the local share of $10 million, the bond principal amount would be about $12 million for general obligation bonds or about $14 million for revenue bonds. The higher amount would provide interest during construction for the revenue bonds as well as a reserve fund that would be required by bond covenants. Bartle Wells has recommended that authorization to issue $18 million in bonds be sought, which would cover cash flow deficits during the construction period as well as financing the local share of capital costs.

User Costs. The California State Water Resources Control Board (SWRCB) has established guidelines for wastewater agency revenue programs (SWRCB, September 1974a). Under the procedures stipulated, Bartle Wells has prepared estimates of user charges which would recover stage II costs of the wastewater facilities system. These charges include user charges and connection fees. Both are estimates and are subject to adjustment pending preparation of a final revenue program, which must be submitted for approval prior to receipt of more than 80 percent of state and federal grant payments. (Additional cost data in Appendix M.)

Service Charges. The regional agency does not plan to levy a property tax. Instead, user charges would be made. Each participating agency would also have a system of charges to cover the cost of operating and maintaining its local collection system. Equalization payments by the regional agency to the local agencies would cover some of this local cost. Local collection systems' costs are not included in the user charges set forth below.

Regional system industrial users would be charged on a formula basis, which would consider both quantity of flow and strength of effluent, based on BOD and suspended solid loadings. Initial estimates indicate that industrial users would provide about 2.7 percent of the estimated total $5 million annual user charge revenues.

Non-industrial users would be charged either a flat rate or a quantity charge based on metered water use. Flat rates would provide about 66.3 percent and quantity charges would provide about 10.8 percent of all user charge revenues. Bartle Wells (1976) preliminary revenue plan indicates that total regional service charge for a single-family residence would be about $54 per year (4.50 per month). The annual charge for apartments (individual dwelling units in multi-family structures) would be about $33 (2.75 per month). It is important to note that these figures are only preliminary at present.

The revenue and expense projections assume that federal installations (Ft. Ord in particular) will prepay the initial cost of capital facilities and will pay an annual charge based on a pro-rata share of operation and maintenance costs including replacement. (Negotiations must be conducted to determine the method to be used by the federal installations to finance their share on a timely basis.) Federal installations would provide about 9.4 percent of all user charge revenues.

Connection Fees. About 10.8 percent of all user charge revenues would be provided by connection fees. Revenue from these fees is projected at $560,000 per year, based on 700 single-family equivalent connections per year. The charge would be set initially at $800 and escalated $50 annually. Bartle Wells characterizes this income as "uncertain" as it is entirely dependent on new connections to the system. If connection charges generated only half of the projected annual income, or $280,000, user charges would have to be increased accordingly.

Property Values. An impact on major investment in public infrastructure may be to cause an appreciation in property values. This is particularly the case where, in the absence of public investment, the land cannot be developed or the intensity of existing development cannot be increased. Such circumstances may exist within the project area, although (as discussed in the chapter on secondary impacts which follows) it does not appear that the no-project condition would pose a severe impediment to future growth in the area.

The incidence of property value increases, to the extent that they may occur, would be determined more by the local services agencies than by the establishment of a regional facilities system per se. Responsibility for construction and maintenance of collectors would remain local; local capital programming and budgeting decisions will continue to establish timetables for service extensions to presently unserved areas.

This combination of factors suggests that the establishment of a regional wastewater system in the project area would not markedly affect property values; differences in values arising from the distribution of service would persist whether or not a regional system is implemented.

Effect on Economic Growth. Regionalization of major sewerage and wastewater treatment facilities may have a supportive impact on future economic development. Major industrial and office employers typically consider the extent, reliability and cost of public services as one factor in their location decisions. The establishment of a regional system incorporating up-to-date treatment processes would remove any doubt potential future employers would have with regard to this particular issue. However, Monterey County has not historically been a rapidly developing employment area and the role of a regional wastewater facility in altering this historical pattern, if any, would be minimal.

Impacts of No Action Alternative

The no action alternative is choosing not to proceed at the present time with any of the proposed wastewater system alternatives described and analyzed in the preceding sections. The wastewater treatment plants now in existence would continue to operate individually, using the same basic treatment and disposal methods currently employed. There are actually two perspectives from which this option can be analyzed. The first analysis considers the consequences of continuing treatment and disposal in exactly the same manner now practiced. The second analysis considers the impact of adjusting treatment and disposal methods at each individual plant in order to meet the requirements of PL 92-500 and RWQCB discharge requirements.

The major consequences of continuing existing operations, without any adjustment, are as follows:

1. Failure to implement any significant water reclamation scheme that might relieve the existing water shortage and reduce the serious overdrafting of the Salinas Valley groundwater basin.

2. Continuation of existing public health hazards and wastewater degradation in the Salinas River, Moss Landing-Elkhorn Slough and nearshore waters of southern Monterey Bay.

3. Possible future public health hazards created by discharges from overloaded treatment facilities, and in some cases, inadequate ocean outfalls. Problems with existing discharges were summarized in the Environmental Setting section (Public Services and Facilities).

4. Failure to comply with deadlines established by the Federal Water Pollution Control Act (PL 92-500) regarding discharge of pollutants to the surface waters of the United States.

5. Failure to comply with the goals and objectives of the SWRCB's Water Quality Control Plan Report - Central Coastal Basin.

6. Failure to comply with RWQCB waste discharge requirements. This could result in the issuance of cease and desist and cleanup orders and ultimately levying of fines of from $6,000 to $10,000 per day.

7. Maintenance of existing warmwater fishery in the lower Salinas River and continuation of periodic fishkills from toxic or low oxygen conditions.

The major impacts likely if each individual treatment plant is improved to meet the PL 92-500 and RWQCB discharge quality requirements and enlarged to handle projected waste flows are as follows:

1. Failure to implement any significant water reclamation scheme that might relieve the existing water shortage and reduce the serious overdrafting of the Salinas Valley groundwater basin.

2. Possible creation of occasional health hazards in the lower Salinas River, Moss Landing Harbor, Elkhorn Slough and the nearshore waters of southern Monterey Bay from discharge of partially treated or untreated wastewater to these shallow water environments.

3. Possible failure to receive federal-state Clean Water Grant funding for necessary facilities improvements, with resultant high local costs for wastewater service. Adoption of a wastewater facilities plan that does not appear to comply with policy established in the SWRCB's basin plan may result in the withdrawal of federal-state financial support of the project. The entire cost of the project would then be borne by the local agency and local residents.

4. Maintenance of existing warmwater fishery in the lower Salinas River and improvement in the river's water quality.

5. Failure to comply with the recommendations of the SWRCB's _Water Quality Control Plan Report - Central Coastal Basin_.

The economic impacts of these no action options would most affect persons living in the study area. Cost of wastewater treatment could become a major service expense rather than a minor one (as is now the case) if fines are levied for noncompliance with federal law and RWQCB discharge requirements. Fines of $6,000 to $10,000 per day can be assessed for violations of discharge permits. The likelihood of government sanctions being incurred if treatment systems do not meet PL 92-500 or RWQCB standards is impossible to assess, however. In the absence of financial sanctions, "no action" may have no significant economic impact. The health problems associated with the individual outfalls would continue to restrict use of the area's surface waters. Considering that there are relatively inexpensive means to improve the area's wastewater service and at the same time benefit various segments of the local environment (i.e., surface water quality, water supply), the no action alternative is not an environmentally acceptable option.

SECONDARY IMPACTS

Introduction

"Secondary Impacts" Defined

Construction and operation of a wastewater treatment and disposal system may have direct and immediate impacts on a host of natural phenomena; these impacts have been described in the preceding chapter. "Secondary impacts" is the term embracing the indirect or induced effects of a project. These impacts may be experienced in all the areas in which primary project impacts are anticipated; that is, the natural environment, land use and population, resource allocation and economic activity. They are the outcome of changes in the pattern of use of land and natural resources for which the project can be seen as the sole or contributing cause.

For example, wastewater service extension may remove an impediment to development of previously vacant land. When the project is completed, that land may be developed. Secondary impacts could conceivably include population growth, changes in land use, disturbance of the natural environment, alteration in resource consumption patterns, and changes in the visual/aesthetic environment. Because these effects are indirect, they may be more difficult to identify and quantify than are direct effects. As a rule, they can be described in terms of type, location and the extent of development which a project area will experience as an indirect consequence of implementation of a wastewater project.

The volume of growth which an expanded wastewater facilities system may serve is important, but estimating the numerical population increase attributable in some degree to the system is not the sole consideration from the environmental perspective. What the EIS must consider is what burden an increase in population may impose on the environment. This burden may differ depending on the form and location of new development. Changes in travel patterns (i.e., travel distances to and from work; for shopping and for recreation), availability of and demand for public utilities (such as water) and services (such as roads), resource consumption involved in land preparation and construction, the foregone benefits of the prior land use -- these and other characteristics of development can vary widely depending on the type and location of development.

Growth is not per se an evil, but it can have undesirable consequences if it takes place in an environmentally irresponsible manner. Thus, the analysis of secondary impacts must consider the relationship between projected growth and the region's environmental resources -- land, air quality, water quality, energy, aesthetics, and wildlife.

The Methodological Approach

In evaluating the environmental consequences of growth in the project area, reference has been made to the extensive work already undertaken by various public agencies within the region and throughout the state.

No independent population forecasts were undertaken by the socio-economic consultant, Gruen Gruen + Associates (GG+A), in connection with this study. The consultant utilized data assembled by the facilities engineers, Engineering Science, Inc., and data provided by Monterey County and the Monterey County Transportation Study. Existing forecasts and comprehensive plans prepared by cities in the region, conferences with local planning officials and relevant data and projections by state agencies supplied inputs to the work. The focus of demographic analysis was on the consistency between population forecasts prepared by various agencies and 1) regional economic forecasts and 2) local plans.

This chapter reviews the dynamics of growth in the region to provide a background for considering the secondary environmental impacts of the project. Possible relationships between population growth and wastewater facilities are explored. Finally, secondary impacts of alternative potential projects on a series of key environmental factors are evaluated.

Dynamics of Growth

Population growth in the Monterey Peninsula and lower Salinas Valley over the 20-year study period will arise from several sources and will be subject to numerous constraints. The existing population is expected to be augmented over time by natural increase and in-migration. A significant proportion of in-migrants will be military personnel.

Population growth may be increased or its rate accelerated by improvements in those features or conditions which attract households to the area and support new development. These would include: 1) increases in the supply of housing; 2) provision for adequate public services, including water, sewers and roads; 3) availability of employment opportunities; and 4) preservation of environmental assets.

The amount of population increase can be diminished and the growth rate reduced by constraints on development. The type and rigorousness of constraints may differ from place to place. Possible constraints include limitations on the availability of resources to construct new housing or to provide new development with essential services. For example, in areas already heavily developed, the lack of additional vacant land hampers further growth. Where groundwater forms the basic supply of that resource, new construction can be delayed or precluded if sufficient water cannot be provided from on-site wells.

Constraints may also be imposed as a matter of public policy. The State of California has imposed or may impose inhibitions on development on certain types of land, such as prime agricultural land, land lying within the coastal zone or land in mapped floodplains. To these may be added the limitations and restrictions established by local government: subdivision controls, zoning ordinances and annexation policies which can affect the type, scale and timing of development.

Public action can sometimes be taken to remove or impose a resource constraint -- such as building a dam in response to a water shortage or denying building permits if environmentally-acceptable wastewater treatment and disposal facilities are lacking.

This section describes the sources of population growth pressures the region will experience and the types of constraints which will affect the volume and rate of growth.

Pressures for Growth

Natural Increase/New Household Formation. The excess of births over deaths is the "natural increase" of the population. As the offspring of present residents in the study area reach the age at which they want to form their own households, they may seek new or existing housing units in the same area as their parents. Data for the U. S. as a whole indicate that the recent high level of housing demand will continue until the late 1980's because the large number of people born in the 1950's are now just entering the housing market.

In-Migrants. In addition to present residents and their children, there are several other market segments drawn to the project area who will comprise a force for population growth. Both young adults and the retired are drawn to the region, often by its natural beauty and pleasant weather. Young adults can find employment in entry-level jobs in tourism, while the retired live on their savings and on income from pensions and Social Security. These groups have both been important in past population increases in the project area.

Recent Census Bureau research indicates that the retired are increasingly moving to rural and mountain areas and away from the so-called "sunbelt". San Luis Obispo County is the only county on the California coast which experienced, between 1960 and 1970, a 15 percent or more net in-migration of persons 60 years and older; the other California counties with significant in-migration of older persons are in the rural mountains of the interior. However, even if this recent pattern persists, it will be some time before it will be reflected in the age distribution of cities such as Pacific Grove, now heavily populated by retirees. A predominance of older people in the population can have an effect on wastewater project implementation, not only because in-migration of the retired is an important factor in population growth, but also because this group may be less willing or able to bear the financial burden a project may impose.

The migration of the young to the project area reflects the overall appeal California has had for young Americans. Traditionally, young adults have been more likely to move than any other age group. Among persons aged 20 to 24, migration rates are highest and long moves (inter-county vs. intra-county) form a higher proportion of total moves than for any other age group (Census, 1974). However, longer moves are more likely than shorter moves to be job-related. Thus, youthful in-migrants to the study area might decline if job growth lags.

Military Personnel. The change in the status of Ft. Ord from a training base to a divisional headquarters is expected to have a marked effect on the housing market in the project area. Although the change in the number of military personnel assigned to the base is not expected to be dramatic, the type of person assigned has altered. Formerly, a significant portion of personnel were recruits who lived on the base. Now, a significant proportion are career personnel, including many persons with spouses and children. The influx of military families seeking off-base housing will reduce vacancies and tend to increase housing costs in nearby communities as this transition is effected.

Existing Housing Shortage. The study area is currently experiencing a very low housing vacancy rate, suggesting that new housing construction has not been keeping pace with demand. This phenomenon is not unique to the study area: rising costs of labor, construction materials and money have contributed to a similar situation in many localities. These costs have risen faster than income in the past 5-7 years, so that households whose income would have supported the cost of a given house in earlier years now find that cost too high. As a result, new households have difficulty finding "starter" units, and long-time residents who want to change the size, location or style of their present residences find their choices limited. The influx of military families aggravates this condition of pent-up demand. However, recent (preceding 1-2 years) increases in real income (i.e., income measured in terms of the goods, such as housing, for which it can be exchanged) combined with falling interest rates may indicate the beginning of a new period of intense residential activity, where other circumstances are favorable.

Economic Growth. Forecasts of regional economic growth serve two important purposes in wastewater system planning: 1) estimating future industrial wastewater loads; and 2) verifying indirectly, the population forecast for the region.

An economic base study of the region, if such a study existed, would be the best aid to forecasting employment and economic growth. However, even a relatively sophisticated economic base study is prone to error when a large number of variables are exogenous to the system. This certainly is the case in the project area with regard to government employment (military and civilian employment on military bases, in particular). Further, recent changes in fertility, labor force participation rates of women, and average family size are prompting economists to reconsider long-range economic forecasts for the nation as a whole, so the absence of a definitive forecast for a region is not an exceptional situation.

In the absence of an economic base study, the approach has been to work with existing data and projections. The principal source of forecasts on future employment growth in the project area is the Monterey County Transportation Study (MCTS) whose forecast of 1995 employment was compared to the forecast for the Central Coast Region in Table 17. The MCTS forecast represents a composite of forecasts of local planning agencies throughout the project area. These individual forecasts were undertaken independently and no attempt has been made to determine the inter-jurisdictional consistency of the forecasts with regard either to assumption or methodology.

Instead, the MCTS forecast was reviewed for plausibility in light of past trends and forecasts of future population. Three tests were applied: 1) is the forecast consistent with historical changes in employment in the study area and projections of existing trends; 2) does it reflect overall changes in national employment, particularly with regard to labor force participation rates; and 3) does it appear to be consistent with population forecasts for the region?

The economies of the Monterey Peninsula and the lower Salinas Valley are quite different from one another. The former is more oriented toward service and professional occupations while the latter is traditionally based upon agriculture and related trade and industry. This division is reflected in state Employment Development Department (EDD) data for the project area, which are reported separately for the Salinas Community Labor Market Area and the Monterey Community Labor Market Area. The reporting areas cover the most urbanized sections of the project area, omitting most direct agricultural employment. However, the data form a good time series back into the 1950's, and annual rates of increase between 1960 and 1970 were computed for four industry groups for each labor market area as a means of comparison with the MCTS 1995 forecast. These industry groupings were selected by MCTS for data aggregation purposes; they are retail trade, service, government, and all else, which shall be referred to as "residual".

Salinas Community Labor Market Area. The 1970 employment inventory of the Monterey County Transportation Study counted about 27,000 employed persons in the Salinas urbanized areas, with some 12,000 additional in the northern part of the project area outside the Salinas urbanized area. Neither the MCTS forecast nor interviews with local planners suggest that any major changes are anticipated for the future, either with regard to the structure of the subregion's economy or the traditional scale of operation of the region's economic establishments. Thus, it appears that the lower Salinas Valley, toward the year 2000, will have the same basic mix of jobs and industries as it has today. About twice as many jobs will exist, and these jobs will be more concentrated in and around Salinas than they are at present, with about 53,000 in the Salinas urbanized area and another 10,000 in the study area north of Salinas.

Monterey Community Labor Market Area. Available data for the Monterey area are less amenable to analysis. EDD data for this subregion include Carmel, which is not in the study area. Substantial present military employment complicates forecasting. However, growth rates by industry for the area were calculated and EDD and MCTS data compared and it was concluded that MCTS-implied growth rates for trade, service and government appear to be low. It appears likely that future employment in the Monterey Peninsula will be higher than MCTS has projected, probably lying in the vicinity of 60,000 to 65,000 compared to about 38,000 in 1970.

Relationship Between Population Growth and Economic Growth. Looking forward to 1995, will there be enough jobs in the study area to support the projected population growth? This issue can be addressed by considering historic and implied future employment-to-population ratios. In 1970, according to MCTS data, total employment constituted 41 percent of the project area population. In 1995, the same proportion would be 37.5 percent. Thus, the implication of the MCTS data is for a decrease in the ratio of employment to population. Because such a decrease is extremely improbable, it is likely that either 1) the MCTS employment projection is too low, or 2) the MCTS population is too high. As the projections are, at best, only rough estimates, one cannot disregard the possibility that both of these explanations of the discrepancy between employment and population apply. However, the employment projection is probably responsible for the greater proportion of the discrepancy for several reasons.

Typically, population projections for semi-rural areas such as northern Monterey County relate strongly to estimates of holding capacity: the total number of residents who can be accommodated on the land under physical and regulatory development constraints. Where development patterns are clearly established, which is the case in most areas of the urbanized north county, and where the long-range demand for housing in a region is strong, this approach to estimating future population can be quite accurate.

However, employment forecasts cannot be accurately derived in the same manner. Changes in the industry base of a community, and intra-industry changes in land requirements per employee, may both be beyond the purview of local planners. The demand for land for industrial use can often be satisfied in a number of different local jurisdictions or, indeed, in a different region altogether. As the MCTS employment projections are simply an aggregate of the views of individual local planning departments, these projections have not been informed by any overall evaluation of the region's economic development prospects. With regard to population-serving employment such as retailing, more than one municipality may be counting in their projections the total retail employment of a single needed new shopping center -- or perhaps none has counted that employment. For these reasons, the employment forecast appears likely to be weaker than the population forecast.

As to the improbability of the implied reduction in the ratio of employment to population, such a decrease would be counter to national and local trends. On a national level, the employment-to-population ratio has been increasing over the last several years and it is generally thought that this will be a continuing secular trend. The rising labor force participation rates of women and the young are more than offsetting the declining labor force participation rates of those over 60. OBERS (U. S. Department of Commerce, 1974) projects an upward trend in the employment-to-population ratio for the water resources subarea of which northern Monterey County is a part. Historical (EDD) data for the 1960's indicates that the ratio has been steadily climbing.

One factor which can operate to dampen this trend in a given region is a large net in-migration of persons not in the labor force, such as retired persons. However, the level of in-migration would have to be quite high to offset the observed long-term trend, and as discussed elsewhere, this region does not now appear to be attracting retired persons to the same extent that it did in the last two or three decades.

Thus, the implied decline in the employment-to-population ratio supports the view that the MCTS employment forecast, particularly with regard to the Monterey Peninsula, is on the low side. Rather than a 1995 employment of 111,000, the level is more likely to be about 120,000 (at the present employment-to-population ratio) or higher.

Constraints on Growth

There exist at present a number of constraints on the future growth in northern Monterey County which will affect its rate and magnitude throughout our study period. Some of these are physical constraints having to do with the ability of the land and resources of the region to support urbanization. Others are institutional constraints reflecting environmental and planning concerns.

Public Regulation. Any development taking place within the project area will be subject to review and regulation by affected public agencies. These agencies and their areas of interest and responsibility were described in the section entitled Legal, Regulatory and Institutional Constraints. The aggregate powers of regulatory agencies are such that the timing, form and scale of construction projects are subject to substantial control by public agencies. Such control is exercised for the purpose of maintaining and enhancing certain public values, such as views, densities, adequacy of public facilities, air quality, and so forth.

Increases in processing time and cost of development have been particularly sharp in the last few years at a time during which construction costs were already rising significantly faster than incomes. For the nation as a whole, median money income of families and unrelated individuals was approximately 31 percent of the average new house price in 1970. By 1974, median money income was only 27 percent of the average price of a new house. With each price rise, some households are cut out of the market and pressures for new construction are reduced. Thus, the regulatory process itself has also recently contributed to an overall downturn in construction.

While personal income may again begin to rise in tandem with housing costs, the prospects for a reduction in development regulation and costs appear minimal. The resumption of 1950's style rapid growth is unlikely in the extreme. Residential growth during that decade gained impetus both from a more rapid rate of population increase than is now being experienced and from government policies which encouraged new residential development by subsidizing road construction and other front-end infrastructure costs. As much of this infrastructure cost has been transferred to the private developer, front-end costs have become a significant barrier to the style of rapid residential development which used to be commonplace.

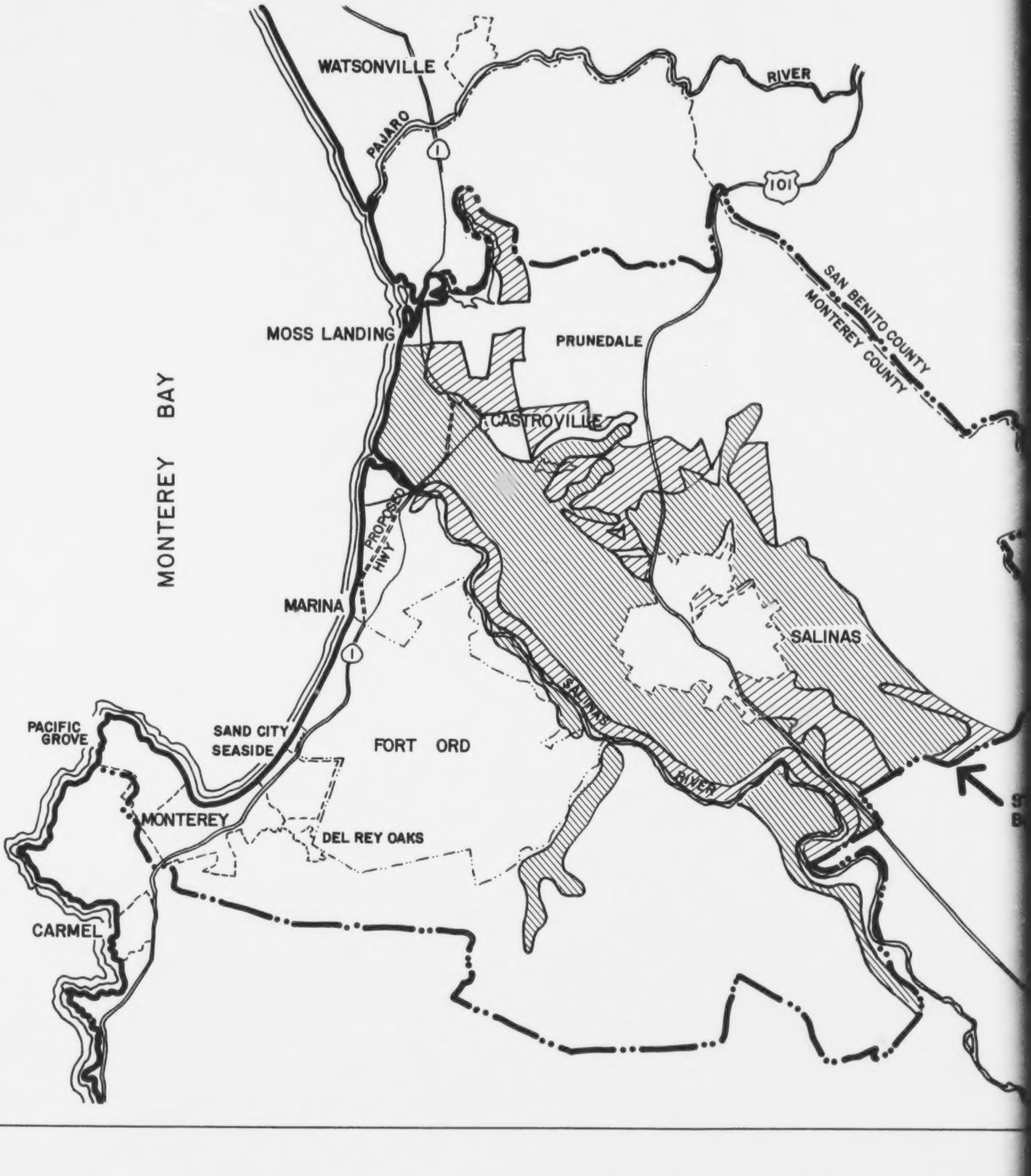
Water Supply. Water supply is presently a growth constraint in much of the project study area. Existing water supply sources and their condition were discussed in the Public Services and Facilities section of the Environmental Setting. It was noted that the Monterey Peninsula supply provided by the California-American Water Company has been grossly inadequate in recent years, stimulating a California Public Utilities Commission building ban in the area. The Salinas Valley groundwater basin, which supplies the entire valley and surrounding low hills, is being seriously overdrafted and intruded by sea water. To date, this has not significantly restricted development; the overdrafting has simply accelerated with local growth. According to Monterey County staff, growth in the north county, including the Castroville-Prunedale area, has accelerated in recent years due in part to the building ban on Monterey Peninsula (Bakeman, pers. comm.). This condition cannot proceed indefinitely, however, without a new source of water.

The adequacy of the water supply may pose a constraint in another major growth center of the project area, the Monterey-Salinas Highway corridor. At the time of interagency reviews of the City of Monterey's _Proposed Highway 68 Area Plan_ in 1975, the Health Department of Monterey County expressed the view that "existing groundwater data for the _Highway 68 Area Plan_ is insufficient for the determination of safe yield" (Wong, pers. comm.).

The _Highway 68 Area Plan_ was developed by the City of Monterey as one in a series of steps to be taken prior to formal annexation of that area to the City of Monterey. The Plan, which was formally adopted by the Monterey City Council on March 16, 1976, sets forth a series of additional steps to be undertaken before any annexation, subdivision or precise zoning can proceed. These include an areawide substrata hydrology study. Also, the council indicated that acceptable responses to possible environmental and infrastructure problems must be made. Pending the outcome of such studies and responses, the adequacy of the water supply to support proposed development (particularly Laguna Seca and Monterey II, which expect to utilize groundwater) has not yet been established.

Land Resources. Urbanization can be inhibited if sufficient reserves of developable land are unavailable. The term "developable" takes into consideration not only the physical capacity of the land (including water supply, slopes, subsoil conditions, etc.) but also the limitations on development imposed by regulatory agencies. For example, development within 1,000 yards (in some cases even further inland) of the coast is subject to the permit authority of the California Coastal Zone Conservation Commission.

Development of prime agricultural land is a matter of concern to local planners and state government. Land in a designated agricultural preserve under the provisions of the Williamson Act must be withheld from development for specified, contracted time periods. Lands in the study area currently subject to Williamson Act conditions are shown in Figure 41. Not all of the Williamson land is prime agricultural land, however, and much of the latter, which is shown in Figure 40, is not in preserve: the agreement to put such land in preserve is not compulsory but is at the initiative of the landowner.


WATSONVILLE
RIVER
PAJARO
1
101
SAN BENITO COUNTY
MONTEREY COUNTY
MOSS LANDING
PRUNEDALE
MONTEREY BAY
CASTROVILLE
PROPOSED HWY
MARINA
SALINAS
1
SALINAS
RIVER
PACIFIC GROVE
SAND CITY
SEASIDE
FORT ORD
MONTEREY
DEL REY OAKS
CARMEL

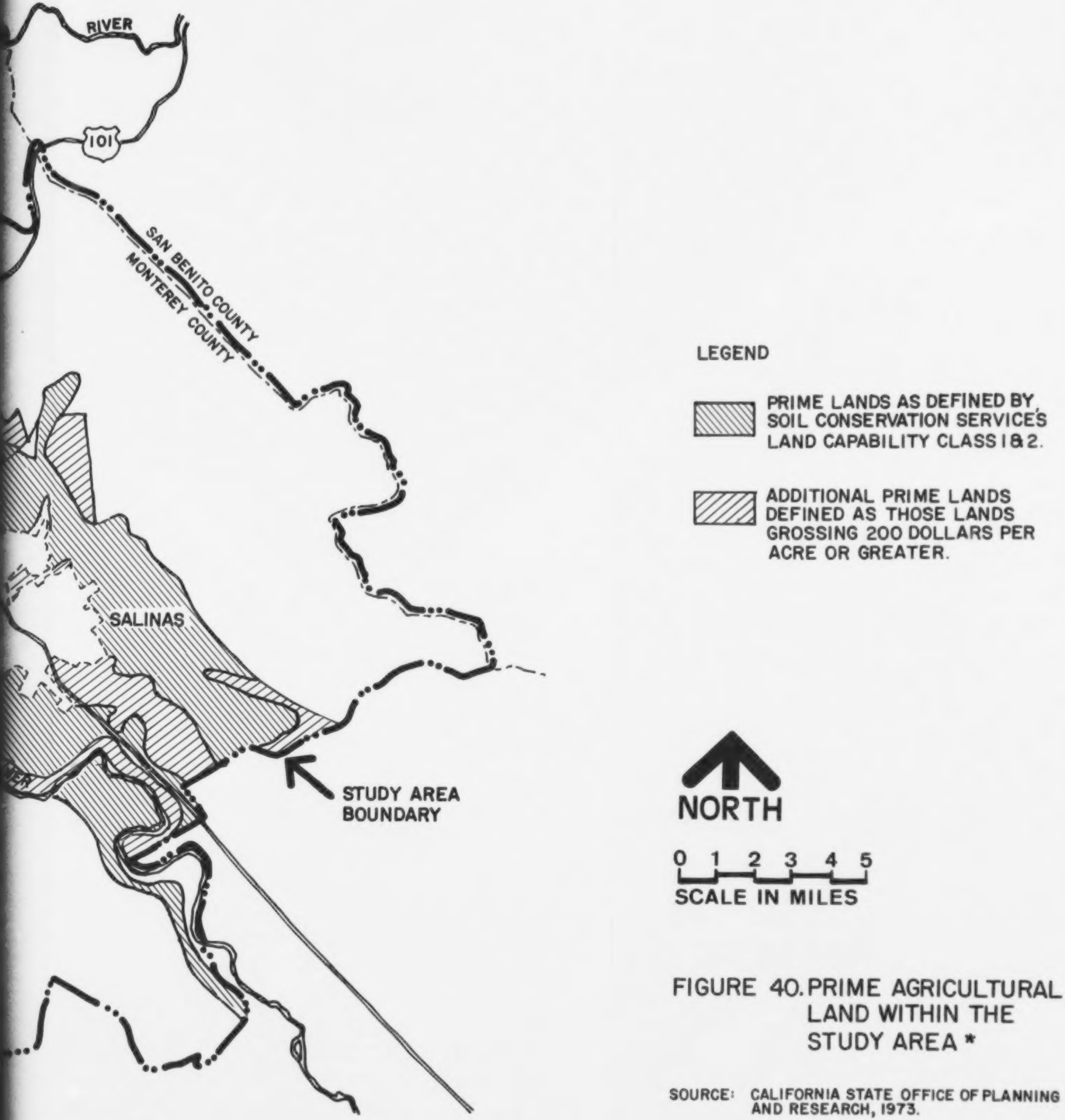

RIVER
101
SAN BENITO COUNTY
MONTEREY COUNTY
SALINAS
STUDY AREA BOUNDARY
LEGEND
▨ PRIME LANDS AS DEFINED BY, SOIL CONSERVATION SERVICES LAND CAPABILITY CLASS I & 2.
▨ ADDITIONAL PRIME LANDS DEFINED AS THOSE LANDS GROSSING 200 DOLLARS PER ACRE OR GREATER.
NORTH
0 1 2 3 4 5
SCALE IN MILES

FIGURE 40. PRIME AGRICULTURAL LAND WITHIN THE STUDY AREA *

SOURCE: CALIFORNIA STATE OFFICE OF PLANNING AND RESEARCH, 1973.

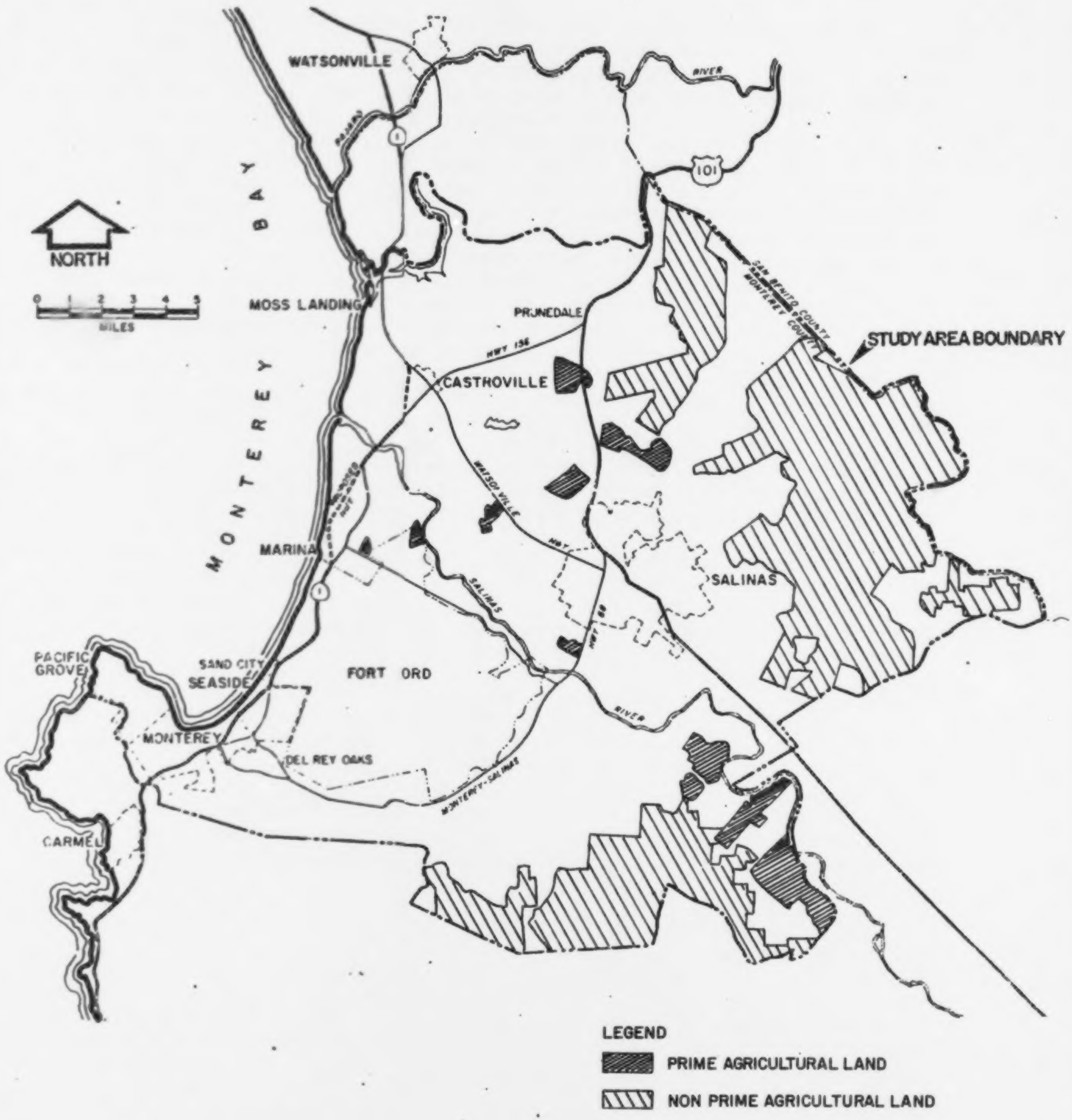

WATSONVILLE
PAJARO
RIVER
1
101
MONTEREY BAY
NORTH
0 1 2 3 4 5
MILES
MOSS LANDING
PRUNEDALE
HWY 156
CASTROVILLE
SAN BENITO COUNTY
MONTEREY COUNTY
STUDY AREA BOUNDARY
WATSONVILLE HWY
MARINA
SALINAS
SALINAS
RIVER
HWY 68
FORT ORD
SAND CITY
SEASIDE
PACIFIC GROVE
MONTEREY
DEL REY OAKS
MONTEREY-SALINAS
CARMEL
LEGEND
▨ PRIME AGRICULTURAL LAND
▧ NON PRIME AGRICULTURAL LAND

FIGURE 41 LAND IN AGRICULTURAL PRESERVE
(SOURCE: MONTEREY COUNTY PLANNING DEPARTMENT, PERS. COMM.)

A bill proposed in the recent legislative session -- AB 15 -- would have restricted development of Class I and Class II prime agricultural lands. Most of the lands on the Salinas Valley floor would have been affected by the passage of this legislation. Only small patches of prime land exist in other parts of the study area. The effect of a constraint such as that envisioned by AB 15 would be to avoid future absorption of prime agricultural lands by urban uses, thereby, in theory, channeling growth into areas of lesser environmental and economic importance. If market demand is very strong and the amount of land reserved for exclusive agricultural use is large, the effect could be to increase densities in existing built-up areas. It could also be an added impetus to development in rural, outlying potential growth centers where little or no prime agricultural land exists. Prunedale, Monterey II and most of the north county would be included in this category. AB 15 was not enacted, but comparable legislation will very likely be considered in the next legislative session. Until such legislation is passed, the extent to which prime agricultural land will become subject to development pressures will be a function of both local and state regulatory activity and administrative vigilance.

The extent to which land availability would pose a constraint on future development can be evaluated by comparing vacant acreage on the one hand to the acreage requirements of projected new development on the other. These acreage requirements can be roughly estimated based on current residential population densities in the urbanized areas and on population projections for those areas. Population densities on residential land in 1970 have been calculated and are presented in Table 43 for the urban portion of the study area. By dividing these densities into 1995 projected population, the 1995 residential land requirements can be estimated. The implied increase in residential land is then compared to land characterized in 1970 as "vacant" to determine whether the reserve of vacant land is sufficient to absorb increased residential development.

This comparison is admittedly very rough, as it does not take into account the characteristics of the vacant land. It may be that some of these lands are inappropriate for development from a physical, market or regulatory perspective. Neither does this method consider the possibility that future development densities may differ from present ones (although this difference does not appear likely to be extreme). It also does not consider differences in land use classification among jurisdictions; for example, we do not know whether vacant land zoned for residential is classified as "vacant" or as "residential". Within these limitations, however, this approach is useful in pointing to those areas where pressures are most likely to be felt.

The overall population density of the urban areas ranged from 23.9 persons per residential acre in Salinas to 29.1 in the Pacific Grove-Monterey-Seaside urban corridor in 1970. If future development takes place at approximately that density, about 2,500 acres of land in these urban areas would be absorbed by residential development between 1970 and 1995. Total acreage classified vacant in 1970 was about 3,100, or 600 acres in excess of that required.

However, looking at the vacant land supply within the urban subareas indicates that, while the supply in the Monterey Bay urban area appears adequate (407 acres needed vs. 1,643 vacant in 1970) the supply of vacant land in the Salinas urban area appears to be insufficient: over 2,098 acres would be needed for residential use, but only 1,442 acres were classified as vacant in 1970. Salinas is the only city reported by MCTS in 1970 as having agricultural land within its urban limits. It is very likely that some of this agricultural land (1,025 acres within the Salinas urban area in 1970) would be subject to pressure for development over the study period.

Outside of the region's urban centers, development would be taking place on land now vacant. The population growth accounted for within the boundaries of the urban areas in Table 43 is about 62,000, accounting for about 42 percent of the projected growth of about 148,000 (compare Tables 43 and 44) between 1970 and 1995. At an average urban density of 26.6 persons per residential acre, about 3,200 acres of land would be absorbed for residential development outside the Pacific Grove-Monterey-Seaside urban corridor and outside Salinas. Some of this conversion is expected by local planners to take place adjacent to the present community of Marina and some along SR 68 between Monterey and Salinas. Considering the projected population growth in the latter area (1970 population of 5,060 in Planning Areas 36 and 41 vs. 1995 projected population of 40,400) much of the vacant land conversion would be taking place there.

Transportation and Accessibility. Current transportation facilities serving the project area are described in the Environmental Setting. Because investment in transportation improvements can often contribute to changes in the magnitude and distribution of growth, consideration must be given to the likelihood of change in the area's present pattern of transportation facilities. That pattern has remained essentially unaltered over the last two decades. Changes have involved primarily increases in the capacity of existing routes rather than construction of new routes. The capacity of Highway 101 was increased in the late 1950's and early 1960's

TABLE 43

Projected Future Residential Land Absorption in Urban Portions of Project Area, 1970-1995

Area	1970 Residential Land			1995 Residential Land			
	Residential Land, Acres	Population	Persons per Residential Acre	Population	Land Requirements, Acres	Residential Land Absorption, 1970-1995	1970 Vacant Land
Monterey-Seaside Area	2,672	77,777	29.1	89,600	3,079	407	1,643
Salinas	2,463	58,896	23.9	109,000	4,561	2,098	1,442
Urban Total	5,135	136,673	26.6	198,600	7,640	2,505	3,085

1970: Monterey-Seaside area includes Del Rey Oaks (population: 1823; acreage: 120.7 residential and 55.2 vacant), Monterey (population: 26,302; acreage: 1088.2 residential and 1233.7 vacant), Pacific Grove (population: 13,505; acreage: 647.6 residential and 29.4 vacant), Sand City (population: 212; acreage: 7.54 residential and 208.5 vacant), and Seaside (population: 35,935; acreage: 808.1 residential and 116.6 vacant). Salinas = City of Salinas. Population figures from U. S. Census; land use acreage from Monterey County Transportation Study (formerly SMATS), Base Year Report, 1970.

1995: Population figures from MCTS 1974 adjusted to planning areas by Engineering-Science (Table 44). Land requirements = 1995 population ÷ 1970 persons per residential acre. Land absorption, 1970-1995 = 1995 land requirements minus 1970 residential land.

when the roadway was expanded from two to four lanes, contributing to the growth of the City of Salinas (Pugnier, pers. comm.). Upgrading of SR 1 began in the middle 1960's and is still under way. The Carmel-Monterey portion was upgraded to four-lane status between 1966 and 1970. The segment between Monterey and Ft. Ord was upgraded between 1970 and 1972, and at present the roadway is being upgraded to freeway status between Ft. Ord and Castroville. Completion of this project is expected by late 1977 or early 1978. However, there are no present plans to change the existing two-lane configuration of State Route 1 between Castroville and Moss Landing through the planning period ending in 1995 (Case, pers. comm.). For this reason, no overall change in present accessibility to the coastal portion of the region is expected over the study period.

Accessibility to the southern employment centers of the project area -- Ft. Ord, the Monterey Peninsula and Salinas -- by those who live north of Castroville will continue to be limited by the two lane configuration of SR 1 in and north of Castroville. New employees of north county establishments may seek new housing in the Castroville area, but the maintenance of the Moss Landing to Castroville Highway in its present state may encourage development to take place east of Castroville rather than to the north. This possibility would be reinforced by any transportation improvements along the Castroville-Prunedale corridor.

The State Department of Transportation is planning the upgrading of SR 156 between Castroville and Prunedale to a four-lane highway some time between 1985 and 1995. Average daily traffic along that route more than doubled between 1964 and 1974. While no funds have yet been committed for this improvement -- and such a commitment appears unlikely according to Caltrans officials (Thompson, pers. comm.) -- discussion of this project will be a factor encouraging development in this area over the next few decades.

Another improvement to north county accessibility, still only in the talking stage, is the possible establishment of daily passenger rail service along the Santa Cruz-Watsonville-San Jose route. Passenger service on a San Jose-Watsonville-Santa Cruz route formerly was provided by Southern Pacific on weekends, but was discontinued in 1965. Recently, the Counties of Santa Cruz and Santa Clara applied to AMTRAK for establishment of service between the Cities of San Jose and Watsonville. The cost of providing service along the San Jose-Watsonville route is currently being investigated by AMTRAK; the participating counties would be obligated to pay 2/3 of any operating cost deficit of such service (Lloyd, pers. comm.).

Provision of Watsonville-Santa Cruz service would be more difficult. Southern Pacific reports that existing trackage between Watsonville and Santa Cruz is rated for 25 miles per hour and new tracks would have to be constructed along this leg to permit reinstitution of service (Sederholm, pers. comm.).

It is not possible at present to determine whether expanded rail service to northern Monterey County via Watsonville will be provided, nor if so, when. But the impact of this concept should be considered, because it would raise the possibility of establishment of a commuter population in northern Monterey County tributary to Santa Cruz on the one hand and the employment complex of Santa Clara County on the other. Given continuing growth of employment in the San Jose area and the recent efforts of the City of San Jose to slow the pace of residential development, any action which would facilitate the access of Monterey County residents to jobs outside the county could be considered growth-inducing. The fact that the idea of expanded rail service has been raised suggests that the north county area is being recognized as a main growth center within the region over the study period.

With the exception of Highway 156 and the rail service concept, little change in the region's accessibility pattern has reached even the discussion stage. No new roadways are in the works and no changes in capacity are planned for State Route 68 or State Route 218. While there are plans to increase the capacity of U. S. 101 through the project area, these are not expected to be realized until after 1995. Acquisition of property is under way, but has not been completed.

Likely Future Growth

Local Population Projections

Forecasts of future population in the study area have been prepared by individual jurisdictions, and systematically assembled for jurisdictions and traffic zones by the Monterey County Transportation Study (MCTS) and presented in column 1 of Table 44. Inputs to the MCTS forecast were revised and updated by the facilities engineer early in 1976. This forecast is presented in column 2 of Table 44. The 1995 series of local projections, as assembled by the facilities engineer, total 338,300 persons in the study area. This projection represents the most recent population summary currently available. The total is about 16 percent higher than the earlier aggregate 1995 total published by MCTS in 1974, with the bulk of the difference of 46,250

Table 44

POPULATION PROJECTIONS OF TOTAL STUDY AREA COMPARED TO POPULATION ESTIMATED TO BE CONNECTED TO REGIONAL SYSTEM BY 1995

Community	Planning Area	MCTS 1995 Population Projection	Most Recent 1995 Projected by Local Jurisdictions	Approximate Proportion Expected to be Served by Sewer Facilities, Percent	Estimated Sewered Population, 1995
Castroville	32	25,000	23,400	42.7	10,000
Castroville S.D.	33		5,600	100.0	5,600
Marina	34	22,500	19,650	100.0	19,650
Fort Ord	35	30,400	22,500	100.0	22,500
Monterey-Salinas	36	12,600	18,300	100.0	18,300
Salinas South	37	10,990	6,500	2.3	150
San Juan	38		20,800	17.8	3,700
Gabilan	39		2,200	6.9	150
Salinas	40	109,000	107,650	100.0	107,650
Toro	41	12,150	22,100	54.3	12,000
Seaside S.D.	42	29,000	34,550	100.0	34,550
Monterey	43	33,300	33,300	100.0	33,300
Pacific Grove	44	22,100	21,750	100.0	21,750
TOTAL		307,040	338,300	{85.5}	289,300
Column Number:		1	2	3	4

Sources:
Column 1: MCTS, 1974 adjusted to planning areas by Engineering Science, Inc.
Column 2: Calculated from data presented in Columns 3 and 4.
Column 3: Personal communication, William Maddaus, Engineering Science, Inc.
Column 4: Engineering Science, Inc., 1976a; 1995 interpolation by Gruen Gruen + Associates from 1990 and 2000 projections.

attributable to the presently non-urban areas of Monterey-Salinas (up 5,700); Toro (up 9,950) and Salinas South, San Juan and Gabilan (up 18,500). The source of the engineer's estimate for the latter area is the preliminary draft housing element for Monterey County rather than the Planning Department; these figures are subject to future revision by the county.

The total projection of 338,300 represents an increase over the 1970 estimated study area total (191,000) of about 148,000. This represents a compounded annual rate of growth of about 2.3 percent, which is slightly higher than the rate of growth in the 1960's, which was about 2.2 percent per year.

A linear projection of 1960-1970 trends would result in a 1995 population of 280,000; this figure would be attained if the historical incremental increase of about 3,700 persons is maintained in the future. A logarithmic projection, based on a continuation of the past rate of population growth, would yield a 1995 population of 323,000. Although the sum of the most recent projections of the local jurisdictions produces an aggregate projection higher than what extrapolation of existing trends would produce, this does not necessarily mean that the projection of 338,300 persons in 1995 is unrealistic.

Because the projection utilized for facilities planning is the product of work by and consultation with local planning agencies, it reflects whatever assumptions and constraints the planners themselves applied. A long-term continuation of development-limiting regulations (such as the current ban on water connections on the Peninsula) was not among these assumptions. If solutions to the problem of water supply are not found, a lower achieved growth rate will result than that projected. The longer the period of time that restrictive conditions apply, the more likely it becomes that projections based on the conditions which prevailed in earlier periods will be overstated.

Projections by State Department of Finance and State Water Resources Control Board

Population projections for the study's potential service area have been prepared by the State Water Resources Control Board to determine the amount of funds that will be made available to the project. The first step in making these projections is a determination of the potential service area. This has been accomplished by the project engineers. The California Department of Finance then makes an estimate of current population (1975) within that service area. The SWRCB utilizes this existing population estimate and the estimated county growth rates (i.e., D-100, E-0) prepared by the Department of Finance to project future population. Allocation of the expected total county population increase to various portions of the county is done by the SWRCB based on intra-county growth patterns developed by the California Department of Transportation in their report, Projected Socio-Economic Data by County and Statewide Zone (California State Water Resources Control Board, 1976a).

Two series of projections were made by the SWRCB. The first, on which project funding will be calculated, is based on the Department of Finance D-100 population projections for the state and the counties. The second, requested by the Environmental Protection Agency (EPA) for comparative purposes, is based on the Department of Finance E-0 projection. The difference between these two projections, which is about 23,000 persons by 1990 (see Table 45 and Figure 42), derives from the fertility and migration assumptions underlying the projection method.

As both net in-migration and fertility have been declining in recent years, the consideration of the E-0 series appears worthwhile. This series yields lower projections of future population than result from extrapolation of historic trends, and it has been more accurate than other Department of Finance projection series in predicting recent state growth.

Relationship of Wastewater Facilities to Growth

As a major element of urban infrastructure, a wastewater facilities system may be supportive of the urbanization process. In the absence of such a system, growth may be inhibited due to the incapacity of the land itself to support on-site disposal systems. In determining the growth-inducing impact of a specific project, it is useful to consider the extent to which growth would take place in the absence of the project and the effect a project would have on the form and spatial distribution of growth.

There are four major types of development conditions in the MPWPCA planning area: 1) infill of vacant parcels in the long-established areas of such older communities as Salinas and Monterey, 2) suburban subdivision development contiguous to existing urban areas, 3) custom homes on individual lots, and 4) major new town-type developments. Some of the anticipated future development would be tied into a regional wastewater facilities system of the type described in this report as a matter of course. Some future development might not be served by a regional system. The relationship between development type and a regional wastewater facilities system is discussed below by type of development.

Table 45

SERVICE AREA POPULATION PROJECTIONS

	Planning Areas	SWRCB 1990 Projections		Facilities Plan[3]		
		E-0	D-100	1990	2000	Ultimate
Castroville	32,33	8,820	9,790	12,800	18,400	22,900
Marina	34	14,110	15,465	17,300	22,000	22,000
Fort Ord	35	omitted[2]	omitted[2]	{ 20,000	25,000	25,000}[1]
Salinas	37-40	92,335	102,860	105,300	118,000	207,200
Toro	41	3,645	4,055	9,000	15,000	15,000
Monterey Peninsula	36, 42-44	84,890	94,435	99,200	116,600	122,000
Subtotal		203,800	226,605	243,600	290,000	389,100
Moss Landing	--	710	825	NA	NA	NA
TOTAL (WITHOUT FORT ORD)		204,510	227,430	243,600	290,000	389,100
TOTAL (WITH FORT ORD)		---[2]	---[2]	263,600	315,000	414,100
Column Numbers	1	2	3	4	5	6

[1] Fort Ord figures excluded from first total for comparative purposes.

[2] Fort Ord projections excluded from state figures because flows from major activities of the federal government are not grant-eligible.

[3] Facilities Plan assumes entire service area population will be connected to regional system, therefore service area and anticipated sewered populations are the same.

NA Not applicable.

Sources: Columns 2 and 3 from State Water Resources Control Board, 1976a, adjusted to 1990 by Gruen Gruen + Associates; Columns 4, 5 and 6 from Engineering Science, Inc., 1976a.

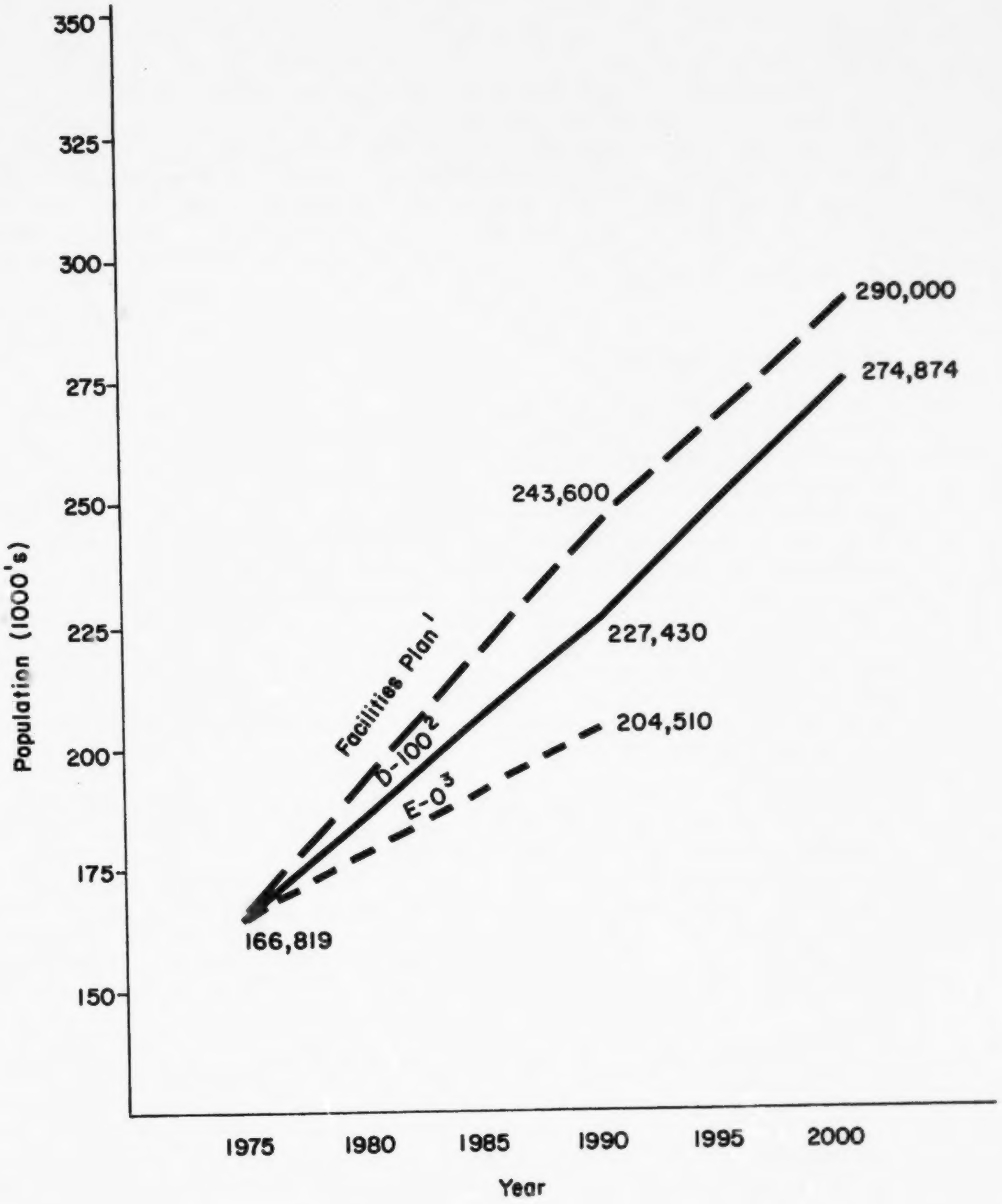


FIGURE 42 SERVICE AREA POPULATION PROJECTIONS

[1] Anticipated sewered population used to size project facilities (Ford Ord subtracted from the Facilities Plan projection to make it comparable with SWRCB projections). Facilities Plan assumes 100 percent sewering of service area population.

[2] SWRCB's maximum fundable population projection for service area.

[3] E-0 projections are used for determining maximum fundable population in an air quality maintenance area.

Infill

Increases in existing densities in cities such as Seaside and Monterey are expected as remaining vacant parcels are developed; occasionally, older single-family units on larger lots are replaced by multi-family units. Increases of this type, which tend to be scattered throughout an area, can typically be absorbed by the existing wastewater system. Regionalization and expansion of the present system would have minimal impact on this type of development.

Suburban Subdivisions

A typical form of urbanization, in northern Monterey County as elsewhere, has been subdividing and residential construction at the urban fringe. This type of development typically utilizes excess capacity in one or more of the existing public service systems so that new housing costs need not immediately reflect total infrastructure costs. The developer's desire to tie into existing infrastructure is one factor discouraging premature development of parcels not contiguous to existing development. "Sprawl" in the form of discontinous development patterns (also called "leapfrogging") may still take place if local development practices and procedures permit it, but it often is a temporary phenomenon, as intermediate vacant land leaped over becomes susceptible to increased pressure for conversion.

Subdivisions at the urban fringe would typically be required to supply the full range of urban services, including wastewater collection and off-site treatment and disposal. In fact, development may not be permitted if excess capacity in one or more service systems is lacking. A shortage of treatment or disposal capacity could, therefore, prove an impediment to this type of new development, while construction of expanded wastewater facilities would accommodate this type of growth.

Low Density Development. The General Plan for the north county area (including the Castroville-Prunedale corridor) which was adopted in 1964 indicated an overall density of four acres per dwelling unit. However, zoning in the area has historically been one/half acre per unit. Development patterns have reflected this inconsistency. Recent changes in zoning are aimed at reversing this trend. Zoning is now about 3.6 acres per parcel, more in line with the General Plan (Bakeman, pers. comm.). This zoning is also designed at least in part to avoid septic tank failure problems. The County Environmental Health Department has taken the position that lots must be at least one acre in size to support a septic tank. Therefore, it appears that low density development could continue in this area without being tied into a sewer system. A similar situation exists in the Monterey-Salinas corridor. Soil conditions and zoning are such that development on lots larger than one acre could continue without a sewer system. Septic tank suitability is evaluated on a lot-by-lot basis, however, as localized soil and slope conditions must be analyzed.

The denser rural developments such as Oak Hills (half-acre lots) and Las Lomas (quarter- and half-acre lots) could reasonably be served by a regional wastewater system. The County Environmental Health Department supports this contention, and in addition suggests that the denser developments in the Monterey II and the Toro-San Benancio-Corral de Tierra areas eventually be served by larger sewage disposal systems (Wong, pers. comm.).

Current zoning north of Marina and north of Salinas would also permit low density development; most zoning stipulates 2.5-acre minimum lot sizes. The feasibility of using septic tanks in these areas must be determined by on-site percolation tests and soil borings; the general soil conditions indicate most large lots could support a septic tank north of Salinas. However, the sandy soils north of Marina have severe limitations for septic tank use, according to the county soil survey (U. S. Soil Conservation Service, 1975). The rapid soil permeability could lead to contamination of groundwater.

In the last decade, low density development in the north county has accelerated, a trend which may have been accentuated by the water connection ban on the Monterey Peninsula. This is the fastest growing area of the county at present, but even at low levels of density, sufficient land exists to absorb roughly 25-30 years of growth (Bakeman, pers. comm.).

Major "New Town" Type Subdivisions

County practice is to require large developments to provide a sewerage system (Bakeman, pers. comm.). The size of major developments makes this approach financially feasible to a project developer as the cost can be spread over a large volume of housing units. Developing and operating a small community or subdivision-sized treatment plant is subject to granting of a permit by the Regional Water Quality Control Board. The RWQCB notes the possibility of problems with package plants or small systems, which include: 1) locating an acceptable disposal site; and 2) achieving a consistently acceptable record of operation and maintenance (small system maintenance is generally poor).

These reservations on the part of the RWQCB may result in the formulation of official policy on the small community systems issue. RWQCB is drafting a resolution to amend the SWRCB's Central Coastal Basin Plan to address this issue. In the meantime, opposition to the proliferation of small community systems by the RWQCB could take the form of denying a discharge permit or imposing extremely restrictive standards on discharges (Baldridge, pers. comm.).

The RWQCB cannot and has not issued a blanket prohibition of small treatment systems. Proposals are reviewed individually at the time permit application is made. Staff reports that the RWQCB would oppose the use of small systems to support continued growth in rural areas such as the Monterey-Salinas corridor and the Castroville-Prunedale corridor -- the areas in which this type of development would be expected to take place (Baldridge, pers. comm.).

The regulatory response to a developer permit application is difficult to forecast. Certainly a developer who puts in a sewer system with a package plant has not necessarily foreclosed the option of having the community system connect to the regional system at some future time, and from that perspective capacity in a regional treatment plant provided in anticipation of this contingency can be considered growth-accommodating. Should the RWQCB make it mandatory that new town scale subdivisions be connected to a regional system from the beginning, then the provision of such a system would facilitate this type of growth, assuming that the connection can be made. If the regional connection is stipulated as a precondition to development, but proves impossible to achieve, then the type of highly concentrated development envisioned for such areas as Montera and Laguna Seca could not be realized, and the spatial distribution of growth would shift from a pattern of fairly dense residential areas encompassed by open space to a large-lot, low density type of development of the type already taking place in the Prunedale area. Such low density development may result in fewer water quality problems, assuming on-site disposal is acceptable; however, it also may effectively foreclose future urban service options (such as transit service) and may result in higher off-site development costs, especially for roads.

Accommodation of Future Growth

The wastewater facilities plan described in this report would accommodate future growth in the region. Two of the four types of development discussed above -- in-fill and fringe subdivisions -- would be connected to such a system initially. A third, the "new town"-type development, might be connected initially, depending on whether such a connection is made mandatory by the RWQCB or local planning agencies. Even if not connected initially, it appears likely that connection would eventually be implemented (assuming that the Highway 68 area developments retain the concentrated form which has been proposed).

Low density development such as that anticipated in the Prunedale area would not initially be served by a regional system and the dispersed nature of this development would make provision of sewerage at any future time very costly. In case development along SR 68 between Monterey and Salinas takes shape as low density, that growth too would not be served by a regional system. The assumptions of the facilities engineer with regard to these two areas are: 1) only the relatively high density existing development along SR 156 between Castroville and Prunedale would be tied to the regional system; and 2) the developments along SR 68 will be in a concentrated pattern and will be connected to the regional system.

The fact that all but low density growth could if necessary be served under the proposed facilities plan does not mean that equivalent growth would not take place in the absence of the plan. The recent experience of a ban on new water connections on the peninsula has shown that growth pressures can be displaced from one area (in this case, the relatively dense urban corridor including Carmel and Monterey) to other areas (the relatively dispersed, low density development in the rural north county). While capital facilities such as wastewater systems accommodate growth, the lack of such facilities encourages low density development which would become the future pattern in rural Monterey County under present planning and zoning conditions.

Strong pressure for development in Monterey County will continue to be felt. Availability of wastewater facilities is one of several factors influencing the location and type of growth to be realized. Water supply, the road network and increasingly effective means of assuring the preservation of prime agricultural lands are other factors at least co-equal in shaping northern Monterey County's urban form in the future.

The facilities plan would provide treatment plant capacity for the anticipated 1990 population growth in sewered areas. It would also provide capacity in the regional interceptor for sewered area population growth to the year 2000. In two of the sewered areas -- Marina and Toro -- it is anticipated that the year 2000 growth to be served by the regional system will be the ultimate population of the sewered area. In three sewered areas, "ultimate" population exceeds the anticipated year 2000 population. These differences are presented in Table 45. They affect Castroville, Salinas and the Monterey Peninsula (Pacific Grove, Monterey, Seaside and the Monterey-Salinas Highway area). In the Castroville area, the ultimate exceeds the year 2000 population by 24 percent; in Salinas, by 76 percent; on the peninsula, by 5 percent. Of these three cases, the facilities engineer has proposed to allow capacity in the regional interceptor only for the Monterey Peninsula ultimate population, where the difference between ultimate and year 2000 population is slight.

Environmental Impacts of Growth

The growth which the region will experience in the future will have associated with it a number of secondary impacts on the natural and human environment. As land is developed, its availability for other use is foreclosed and its encumbrance with structures housing human activities implies a series of on-site and off-site effects. These would involve all of the types of facilities which are required to support human activity and all of the effects which expanded population and activity have on the natural environment. Major areas of possible secondary impacts are as follows.

Land Use

The most visible sign of population growth is the gradual loss of open land. This, in turn, may have impacts on aesthetics and wildlife (discussed below) and it may, depending on the pattern of development which emerges, result in a loss of economic benefits as well if the urbanized acreage is taken out of active agricultural production.

As discussed earlier in this chapter, conversion of vacant land to urban use could affect as much as 6,000 acres by the year 1995 if population growth takes place at present population densities. However, present urban densities in the Monterey-Seaside area and Salinas are well in excess of even the highest density development now permitted by the county. As Table 43 shows, current average urban densities are 26.6 persons per residential acre. At a household size of 2.75, that would amount to approximately 10 housing units to an acre, or five times the density of a half-acre-per-unit development.

As larger developments are proposed, densities higher than one-half acre of residential land per unit appear likely. Since large developments must provide urban services, residential concentration is in the interest of the developer. Both annexations and large developments in unincorporated areas will be affected by this consideration. In the case of annexations, which applies to the SR 68 corridor (to be annexed to the City of Monterey) and to the presently rural areas north and northeast of Salinas (where annexation to Salinas appears likely), current procedures are for the city to which the development is to be annexed to work with the developer, thereby assuring that the development will be consistent with the city comprehensive plan in terms of density and development form.

In the unincorporated county, various subarea plans indicate objectives of retaining agricultural uses. For example, the Castroville and Moss Landing area plans both state that future growth should not encroach on prime agricultural lands. The plans also advocate the protection of wildlife habitat along the sloughs and coastline. Implementation of these policies with regard to development proposals takes place on a case-by-case basis and may occasionally go further than these concerns (Bakeman, pers. comm.) to include stipulations with regard to specific features (such as groves of trees).

Both city and county development review procedures take note of proposed densities and potential environmental conflicts. If the planning agencies promote higher densities by putting the same number of housing units on a smaller land area (thereby leaving more land in open space), then conflicts with agricultural land and environmentally sensitive areas will be lessened. However, there may be resistance to this approach by those who find the visual impacts of denser settlement patterns adverse. Where sparse development permits, responsibility for water supply and wastewater disposal can be borne by the homeowner; avoidance of municipal responsibility for these functions can be another factor in encouraging new development to take place at low densities. These factors may also be considered in the development review process.

Although no prime agricultural land preservation legislation is yet in effect, it appears likely that such a law will be passed, probably within the next three years, thereby adding to municipal and county efforts in this area the weight of state law. In the meantime, with the possible exception of lands lying within the city limits of Salinas, vacant land conversion in the project area is likely to affect lands of only marginal agricultural value.

Public Services and Utilities

Every new housing unit brings with it new revenue and added costs to government(s) within the jurisdiction(s) in which it is located. Revenues include both direct payments in the form of property taxes, calculated on the basis of the value of the housing unit and the government agency tax rate, and indirect payments such as sales taxes and motor vehicle taxes, which are collected by the state and returned in part to the local jurisdiction. The cost is made up of the individual costs of public agencies in responding to the added household's demand for public services.

The fiscal impact of a new housing unit depends on a variety of factors. Important among these is the assessed valuation of the land and building, which is the basis of property taxation. Also important is the type of household. If there are school-age children, then educational costs will be incurred; childless households pay school taxes even though they have no children in the local school system.

Fiscal impacts of the same housing unit may also differ among the government agencies in whose jurisdiction the home is located. This variation arises from differences in ability of the governments or districts to extend service to the new unit without incurring additional capital or operating costs. From this point of view, a household with school-age children could settle in the Monterey Unified School District area, which has excess capacity in its physical plant, imposing a lower cost on that district than it would impose on one of the north county districts with expanding enrollment, for which new facilities will eventually be constructed.

These three factors -- differences among new residential units in amount of revenue generated, differences among new households in type and amount of costs imposed, and differences among government agencies in the extent of their excess capacity -- are the major considerations which make it impossible to generalize about the relationship of growth to a region's fiscal status. This work can be done with a fair degree of accuracy for specific new developments or for new towns (where the entire infrastructure is new); for a region as large and varied as northern Monterey County, it is impractical. However, by considering the magnitude of growth anticipated -- 148,000 between 1970 and 1995 -- it is clear that no public service has sufficient excess capacity to extend service to all of the added population. This means that expansion of public service systems can be expected, with the costs paid for by present and new residents.

Water Supply

As mentioned in the Environmental Setting section, much of the study area is currently suffering from domestic and agricultural water supply problems. The Monterey Peninsula is operating under a building ban due to insufficient water supply. Groundwater supplies in the lower Salinas Valley are deteriorating in quality due to overdrafting and resultant salt water intrusion. The direct impact of the various proposed regional wastewater systems on water supply was described in an earlier section of this report. Several alternatives could increase the local water supply by reusing treated domestic wastewater for crop irrigation. The secondary impact of a new wastewater system on the local water supply is not as easily defined, however.

The proposed project would supply wastewater treatment facilities for a population in excess of current numbers. The 1975 project service area population is estimated at 166,819 (191,113 with Ft. Ord; California State Water Resources Control Board, 1976a). The 1990 design capacity of the regional wastewater treatment plant is based on a service area population of 283,600 (Engineering Science, Inc., 1976a); the interceptor system is sized to accommodate flows from a future service area population of 320,400. As mentioned above, the sewer facilities would not necessarily cause or induce this growth; other services and facilities would be needed. In many instances, the growth could occur without the wastewater facilities. However, if sewer facilities are installed and other basic services are provided so that populations increase, in the absence of additional water supplies, there would be even more serious overdrafting of existing local water supplies. Because of the building ban on the peninsula, growth would likely occur to a greater degree in the Salinas and Castroville areas and the north county. Growth in Salinas and Castroville would intensify the overdrafting of the 180- and 400-foot aquifers in the Salinas River basin and increase the salt water intrusion problem in the Castroville area.

Even in the absence of new regional wastewater capacity, there is likely to be continued and increased pressure for development of new water sources in the area. In order to accommodate the populations projected in the Facilities Plan, local sources must be better utilized; water conservation strategies must be developed, implemented and enforced, or outside sources must be tapped. There are several other sources currently being investigated. The wastewater to be treated by this project is one potential source. Tapping of deeper aquifers in the Salinas Valley, increased surface releases from Nacimiento and San Antonio Reservoirs, and enlarged and new dams on the Carmel River are also being investigated as new sources of water.

Water conservation measures applied by individual and industrial users and reuse of the treated wastewater appear to be extremely advantageous methods of relieving the regional water shortage situation. There are potential adverse environmental consequences of reusing wastewater for irrigation, but these could be investigated by the planned pilot project prior to full implementation. Specific water conservation programs already in effect are described in the Public Services and Facilities section of the Environmental Setting. Similar efforts could be advanced by other cities and the county, including changes in the building codes to encourage use of more efficient water fixtures and appliances. City councils, the Board of Supervisors and departments of public works could all have a hand in implementing conservation measures. An effort at public education could be made through local school districts and the water suppliers themselves.

Increased storage and surface releases from Salinas River watershed reservoirs have limited potential; this water is already being utilized at near its full potential. Additional upstream diversions would only reduce the amount of water now percolating to the groundwater table, which acts as the major water supply for Salinas Valley communities. The reliability and general quality of water from deeper aquifers in the Salinas Valley is now being investigated. There are questions, however, on the effect deep aquifer pumping will have on the 180- and 400-foot aquifers which currently supply water to Salinas Valley residents. New dams on the Carmel River present a whole list of economic and environmental concerns. The cost of a new dam would be great (over $100 million) and the effects on downstream fisheries, vegetation and groundwater supplies could be significantly adverse. Reduction in downstream flows, especially in the dry months, could destroy riparian vegetation, eliminate fish habitat and drop groundwater levels in areas being actively pumped for domestic water supply. Numerous sites and sizes for reservoirs have been contemplated on the river, but no project is being actively pursued at present.

The most extreme method of reducing secondary impacts on water supply (associated with regional growth) through the facilities planning process would be to limit wastewater treatment capacity to the existing population. Limiting the provision of public services is being used more and more frequently as an indirect method of limiting growth, as is prohibition of growth generators like new employment sources and second home subdivisions. Limiting growth is not necessarily the best method of solving the water supply problem, however. Wiser use of existing supplies, active water conservation programs and beneficial reuse of wastewater wherever possible are more positive mitigations for increased water demands.

Water Quality

The conversion of land to industrial, commercial and residential uses that accompanies growth can increase water quality problems as well as problems with water supply. The two most obvious areas of concern are increased urban runoff and soil erosion. As agricultural or undeveloped land is covered over by buildings and pavement, the amount of precipitation that runs off as overland flow increases. Oil and grease and the wide variety of chemicals that are used around dwellings are carried in greater quantities into storm drains and surface waters. Where soils have been disturbed during construction, the heavier runoff carries with it soil material; this affects both the quality of surface waters and their value as wildlife habitat. Most urban runoff enters storm drains or natural drainageways; it therefore passes untreated into the surface and groundwaters.

Control of urban runoff and erosion has received little attention in the past. This is mainly because neither has contributed to the wastewater treatment problems of local agencies. However, PL 92-500 requires development of plans to control these non-point sources of pollution. The 208 planning in north Monterey County is being conducted by AMBAG. Their work plan included an analysis of non-point sources of pollution in the lower Salinas Valley, including increased urban runoff from Salinas. Impacts are to be identified and mitigations suggested. This 208 Plan appears to be the proper vehicle for adding detail to this brief analysis of growth-related water quality problems. Especially important will be the assignment of responsibility for reducing urban runoff and erosion problems. Erosion can be controlled to a great extent by proper building inspection and regulation of development on steep slopes or highly erosive soils by the county building inspector and planning department. Avoiding disturbance of steep slopes and replanting denuded areas are effective erosion control measures. Urban runoff is more difficult to control. Limitations on the percent coverage structures may have on residential or commercial lots could help. A more effective but more costly measure would be to channel storm drain water through a wastewater treatment system. This would have to be implemented by public works departments or sanitation districts and is unlikely to occur in the near future because of the high cost involved.

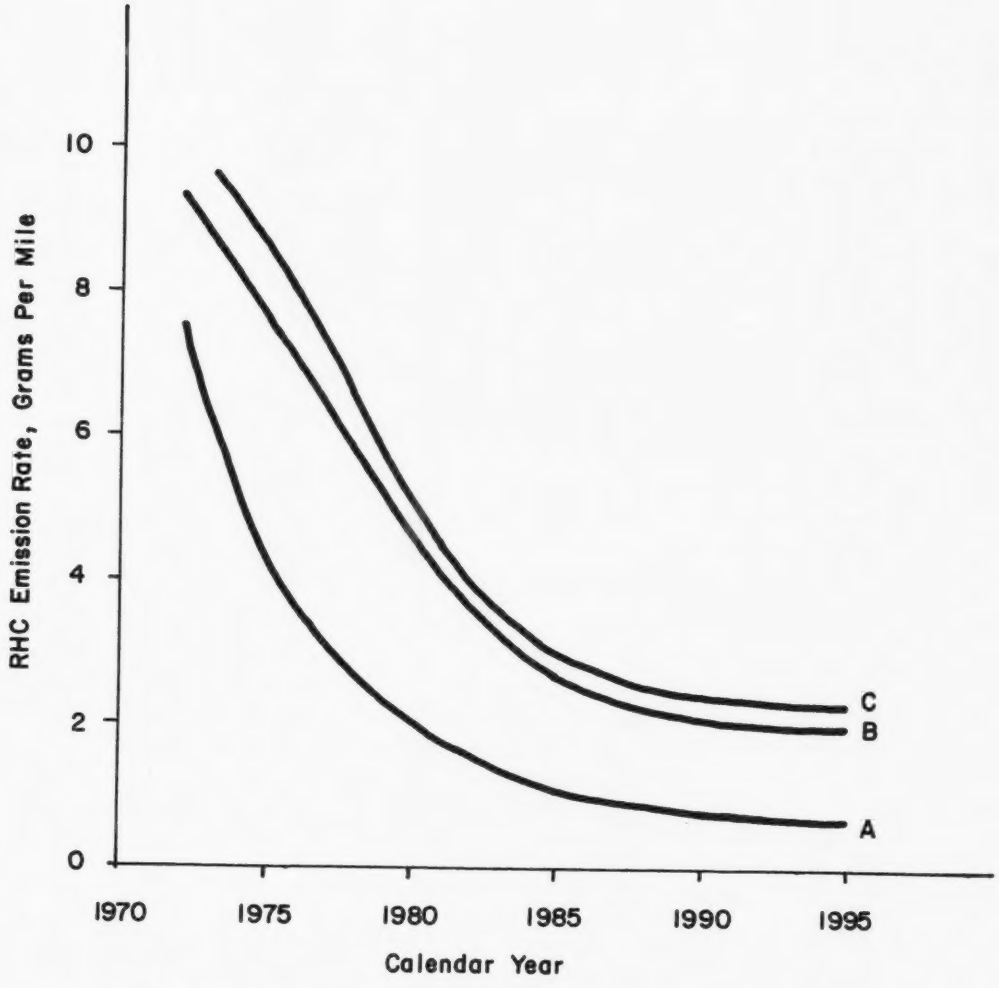
Air Quality

Introduction. Wastewater treatment facilities are an essential requirement for modern urban areas. Their availability is one of several factors influencing the type, amount and location of future urban development. Future development accommodated by the proposed project will influence air quality conditions in Monterey County through the presence of increased vehicle traffic and the development of new stationary sources of air pollutants.

During the preparation of this EIS, the air quality implications of the proposed project have been examined in detail on three separate occasions. The results of the first evaluation, completed in February 1976, are presented in Appendix A-5. Revisions to the technical data used in that air quality analysis and changes in the design basis for the proposed project necessitated the additional air quality evaluations. These considerations are discussed in detail in Appendix A-7. The significance of some of these factors is reflected in Figure 43 and Table 46. Figure 43 illustrates the recent revisions which federal and state agencies have made to their estimates of reactive hydrocarbon emission rates from the vehicle population expected to be operating in Monterey County. Table 46 compares the Department of Finance D-100 population projections with the population projections currently being used as a design basis for the proposed project. When Appendix A-5 was originally prepared, project sizing was based on a population projection prepared for the Monterey County Transportation Study. This population forecast (407,000 for the county in 1995) was only slightly larger than the Department of Finance D-100 projection of 396,500, which served as a basis for the air quality evaluation presented in Appendix A-5.

The major concern regarding future air quality in Monterey County centers on oxidant levels. Thus, all revisions to the air quality analysis presented in Appendix A-5 focused on hydrocarbon and nitrogen oxide emissions and subsequent oxidant and NO_2 levels.

Emissions Forecasts. At the time the present air quality analysis was prepared (February 1977), two sets of historical emission inventory data were available -- data from the local air pollution control district and data from the California Air Resources Board. The ARB estimates for 1973 differ from the APCD estimates in several respects (see Appendix A-3). The discrepancies regarding stationary source emissions were resolved through discussions with the staff of the ARB Emissions Inventory Unit. Discrepancies in motor vehicle emission estimates related



A = Values used in February 1976 analysis
B = Values used in November 1976 analysis
C = Values used in February 1977 analysis

FIGURE 43 TRENDS IN COMPOSITE VEHICLE REACTIVE HYDROCARBON EMISSION RATES

Table 46

COMPARISON OF SERVICE AREA AND COUNTY POPULATION PROJECTIONS

Year	Facilities Plan Projections[1] Sewered Population	Facilities Plan Projections[1] Total Service Area Population	California Department of Finance D-100 Projection Service Area[2]	California Department of Finance D-100 Projection County[3]	County Composite Projection[4]
1972				253,300	
1973				255,400	
1974				261,600	
1975			166,819	271,600	
1979			181,825	(293,307)	
1980	204,800	214,233	[185,354]	299,000	327,879
1985		(229,981)	[206,645]	329,800	363,136
1989			222,683	(355,396)	
1990	263,600	268,824	[226,884]	362,100	404,040
1995	289,300	338,300	[249,461]	396,500	485,339
1998			265,392	(421,821)	
2000	315,000	371,540	[269,531]	428,400	530,409

NOTES AND SOURCES:

[1] Derived from Table III-6 in Engineering Science, Inc., 1976d; value for 1985 interpolated using logarithmic growth rate ($N_t = N_o e^{rt}$); values for 1995 from Table 44 of this report.

[2] California State Water Resources Control Board (pers. comm.).; values in brackets calculated from ratios of service area population to county population for previous or subsequent entries.

[3] California Department of Finance, 1974; values in parentheses interpolated using logarithmic growth rates.

[4] Facilities plan projections for service area plus D-100 projection for remaining portions of the county. (County D-100 population - service area D-100 population + service area facilities plan population.)

to two factors: use of different vehicle emission factors; and apparently significant differences in estimates of historical VMT levels. To maintain consistency between base year and forecast year emission estimates, neither the APCD nor the ARB vehicle emission estimates were used. Instead, two different sets of historic and projected VMT levels were used to generate alternative base year and forecast year motor vehicle emission estimates.

Emissions forecasts for 5-year intervals from 1980 through 1995 were prepared assuming two different levels of urban development (based on the Department of Finance D-100 and the "county composite" population projections presented in Table 46). The basis for estimating future emissions from stationary and mobile sources is explained in Appendix A-7. Two estimates of motor vehicle emissions were made for each population projection in order to cover a range of possible vehicle usage estimates. The MCTS-derived data involve a 1973 daily travel level of 19.5 VMT per capita. This is projected to increase to 20.3 VMT per capita by 1995. The alternative VMT analysis (designated ARB-DMV) involves a 1973 daily travel level of 13.6 VMT per capita. This is projected to increase to 15.0 VMT per capita by 1995. Thus, the MCTS-based forecasts assume a 14.4 percent increase per capita VMT between 1973 and 1995 while the ARB-DMV-based forecasts assume a 10.7 percent increase.

Techniques for Evaluating Future Ambient Air Quality. A large number of different procedures have been developed for estimating ambient air quality changes under specified conditions. Many of these procedures are appropriate only for certain types of projects (highways; parking lots; major point sources such as power plants, etc.). When the impact of generalized urban development is the primary concern, available procedures can generally be classified into two categories: "mechanistic" simulation models of variable complexity; and simple statistical extrapolations from historical data.

The major appeal of complex simulation models lies in the fact that they can be structured to explicitly deal with the numerous factors which are known to affect ambient air quality. In general, a usable simulation model should deal with the following factors:

- Spatial and temporal distribution of emission sources.
- Meteorological and topographic factors influencing pollutant transport.
- Meteorology and atmospheric chemistry affecting the residency of primary pollutants (directly emitted pollutants) and the formation of secondary pollutants (generated from primary pollutants by chemical reactions in the atmosphere).

This potential for dealing with the "real world" complexities of the various processes which affect air quality is also the basic reason such models are seldom used. As such models are made more complex to reflect actual physical and chemical processes occurring in the atmosphere, the requirements for detailed, geographically specific base data increase substantially. Most of this required data is not readily available and must be developed through special and/or long-term studies. In addition, as these models become more complex, it becomes necessary to use advanced computer technology to perform the required calculations. The results of such models, no matter how complex, can be no more accurate than the base data and mathematical equations used in the model to describe physical and chemical processes occurring in the atmosphere.

The rollback procedure, on the other hand, avoids any attempt to deal explicitly with the complexities discussed above. Changes in ambient air quality are assumed to be proportional to changes in total emissions of the pollutant of concern (or the precursor emission products for secondary pollutants). Natural background levels of pollutants can be considered as a special factor if data is available. In addition, the basic rollback equation (see notes to Tables 47 or 48) can be modified to account for influx of pollutants from outside the study area if data on this is available, although this is seldom done.

While simulation models are often designed to forecast a geographic distribution of pollutant levels, the rollback technique produces a single value for future air quality. Depending on the base data used in the rollback analysis, this may represent a potential "worst case" situation, average hourly pollutant level, etc.

The following simplifying assumptions inherent in the rollback approach must be recognized when determining how to use this procedure or how to interpret its results. Pollutant emissions are assumed to be constant through time and geographically uniform. Transport of pollutants into or out of the study area is normally assumed to be negligible. Meteorological factors are not directly considered; implicitly, the rollback technique assumes that meteorological conditions in a future year are essentially identical to the base year used. Finally, chemical reactions among pollutants are not considered. Some of these limitations are counter-balanced by using the highest reported pollution levels as base values in the model; such a procedure implicitly assumes that this represents a combination of unfavorable conditions.

It should also be apparent that the rollback procedure is most appropriately used to evaluate the air quality implications of a given overall amount of development. It is not, however, well suited to comparing the air quality implications of alternative spatial distributions of land use or alternative time distributions of pollutant-generating activity patterns.

Interpretation of the results of any air quality analysis should recognize that all forecasting procedures and models are best utilized for estimating air pollution potential rather than making air quality projections (in the same sense that population projections are made). On a year-to-year basis, air quality is usually determined primarily by weather patterns and conditions. The ability to predict future ambient air quality conditions is limited by numerous considerations, not the least of which is the inability to confidently predict future weather conditions in any detail. Thus, even the most sophisticated computer models which may be developed in the foreseeable future will be unable to predict ambient air quality conditions for specific dates in the future. Current and anticipated air quality models are more properly utilized to predict the potential for meeting or exceeding established air quality standards based on pollutant emission forecasts for given future years. Rollback techniques approach this issue through the use of "base year" data reflecting serious pollution episodes experienced in the recent past. A "worst case" analysis can be approximated by using the year showing the highest ratio of observed peak ambient pollution level to estimated daily emissions of the appropriate pollutant.

Potential Oxidant and NO_2 Levels in Monterey County. The analysis of potential oxidant and NO_2 pollution in Monterey County was performed using the simple rollback procedure discussed above. Table 47 presents a series of alternative forecasts of potential maximum 1-hour oxidant levels in Monterey County. Two population forecasts (D-100 and "county composite") were combined with two different sets of VMT assumptions (MCTS and ARB-DMV) to produce four basic population/VMT alternatives. The differences in total VMT levels between the MCTS and ARB-DMV forecasts are shown in Table IV of Appendix A-7. The differences in underlying daily per capita vehicle travel rates were identified above. Aircraft, railroad, stationary and miscellaneous area source reactive hydrocarbon emission levels are related to population growth assumptions (Tables VII and VIII in Appendix A-7). Motor vehicle reactive hydrocarbon emissions are based on VMT levels and weighted, class-composite vehicle emission factors (Tables IV and V of Appendix A-7).

Table 47

INFLUENCE OF ALTERNATIVE VMT ESTIMATES AND BACKGROUND OXIDANT ASSUMPTIONS ON PROJECTED MAX-HOUR OXIDANT POTENTIAL FOR MONTEREY COUNTY

VMT Forecast	Population Basis	Parameter	1974	1980	1985	1990	1995
Adjusted MCTS Data	D-100 Projection	Vehicle RHC	52.0	34.1	23.1	20.9	21.9
		Total RHC	71.5	57.4	49.8	50.6	54.4
		OX @ B = 0	0.112	0.090	0.078	0.079	0.085
		OX @ B = 0.005	0.112	0.091	0.080	0.081	0.086
		OX @ B = 0.01	0.112	0.092	0.081	0.082	0.088
Adjusted MCTS Data	County Composite Projection	Vehicle RHC	52.0	37.7	25.4	23.2	26.8
		Total RHC	71.5	63.2	54.3	56.8	63.3
		OX @ B = 0	0.112	0.099	0.085	0.089	0.099
		OX @ B = 0.005	0.112	0.100	0.086	0.090	0.100
		OX @ B = 0.01	0.112	0.100	0.087	0.091	0.100
ARB-DMV Data	D-100 Projection	Vehicle RHC	36.2	23.5	15.9	14.2	14.8
		Total RHC	55.7	46.8	42.6	43.9	47.3
		OX @ B = 0	0.112	0.094	0.086	0.088	0.095
		OX @ B = 0.005	0.112	0.095	0.087	0.089	0.096
		OX @ B = 0.01	0.112	0.096	0.088	0.090	0.097
Adjusted ARB-DMV Data	County Composite Projection	Vehicle RHC	36.2	25.8	17.3	15.7	18.1
		Total RHC	55.7	51.3	46.2	49.3	54.6
		OX @ B = 0	0.112	0.103	0.093	0.099	0.110
		OX @ B = 0.005	0.112	0.104	0.094	0.100	0.110
		OX @ B - 0.01	0.112	0.104	0.095	0.100	0.110

NOTES AND SOURCES:

Alternative VMT and population projections presented in Table IV of Appendix A-7.

RHC = Reactive Hydrocarbons. Motor vehicle and total RHC emissions given as tons per day, annual average (values taken directly from or calculated using Tables III through VIII of Appendix A-7).

OX = Ambient oxidant level in parts per million (ppm) by volume; 1974 oxidant level from Appendix A-4, corrected by 0.8 factor to account for recent change in calibration procedures for monitoring instruments (see Appendix A-2).

Federal 1-hour primary ambient air quality standard for oxidant = 0.08 ppm.

California 1-hour ambient air quality standard for oxidant = 0.10 ppm.

B = Natural background oxidant level in ppm.

Projected Max-Hour oxidant potential based on unmodified "rollback" technique:

$$AQ_{fy} = B + (AQ_{by} - B) \text{ X } \frac{E_{fy}}{E_{by}}$$

Where: AQ = Ambient air quality (ppm)
B = Natural background pollutant level (ppm)
E = Emissions of precursor pollutant; RHC emissions, tons per day
by = Base year; 1974
fy = Forecast year

In addition, the influence of different assumptions regarding natural background oxidant levels was evaluated. While natural background levels of ozone and other oxidants do exist, no estimates of such levels for the Monterey Bay area have been made. Within the range of values tested, choice of background level had only a minor influence on projected potential oxidant levels.

The base year used in this analysis (1974) was not the year with the highest reported oxidant level in Monterey County. Peak oxidant levels reached 0.136 ppm (corrected at 0.8 factor, see Appendix A-2) in 1971 and 0.128 ppm (corrected) in 1973. Due to changes in emission estimation procedures, changes in stationary source controls, and related factors, preparation of an adequate emission inventory for 1971 would pose several problems. However, county APCD estimates (Appendix A-3) indicate that 1971 and 1973 stationary source total hydrocarbon emissions were essentially the same. Based on the modified emission inventories for 1973 and 1974 (Table III of Appendix A-7), 1974 had the highest ratio of maximum oxidant level (monitoring station data minus natural background) to total reactive hydrocarbon emissions. Only if natural background oxidant levels exceed 0.021 ppm would 1973 be the most appropriate year to use in the rollback analysis.

Figure 44 presents the data from Table 47 in graphical form. This clearly indicates that if development actually occurs at the rate anticipated by local planning agencies and assumed as a basis for sizing the proposed project, the federal health-related air quality standards for photochemical oxidant will not be achieved and maintained during the period through 1995. Some individual years during this period may not report oxidant levels above the standards, but this will be due primarily to meteorological conditions more favorable than those experienced in 1971, 1973 or 1974.

On the other hand, if development actually occurs at a rate similar to that assumed for the Department of Finance D-100 projections, the federal oxidant standard may be temporarily achieved and maintained during the 1985-1990 period. Unless 1973 and 1974 truly represent "worst case" meteorological conditions (which is doubtful), at least an occasional violation of the federal health-related oxidant standard should probably be expected during the 1985-1990 period in Monterey County even under D-100 level growth.

Table 48 presents forecasts of potential maximum 1-hour nitrogen dioxide levels in Monterey County. The four alternative population/VMT forecasts discussed above were analyzed. The natural background level for nitrogen dioxide was taken from

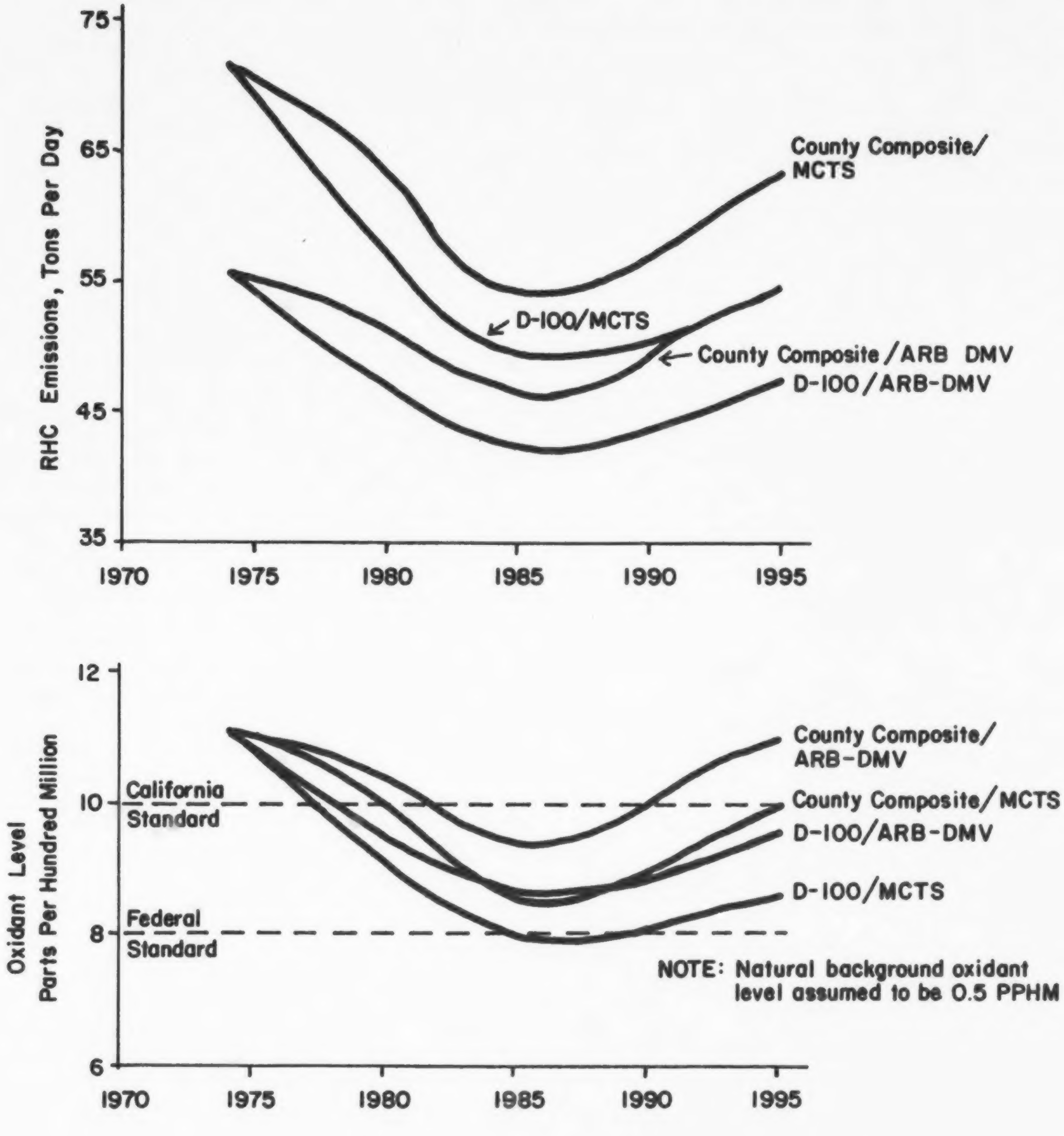


FIGURE 44 PROJECTED REACTIVE HYDROCARBON EMISSIONS AND RESULTANT POTENTIAL OXIDANT LEVELS ASSUMING ALTERNATIVE POPULATION VMT FORECASTS

Table 48

INFLUENCE OF ALTERNATIVE VMT ESTIMATES ON PROJECTED MAX-HOUR NO_2 POTENTIAL FOR MONTEREY COUNTY

VMT Forecast	Population Basis	Parameter	1974	1980	1985	1990	1995
Adjusted MCTS Data	D-100 Projection	Vehicle NO_x	29.5	28.2	27.7	30.5	34.5
		Total NO_x	67.6	86.4	98.7	116.1	115.0
		NO_2 level	0.15	0.191	0.217	0.255	0.252
Adjusted MCTS Data	County Composite Projection	Vehicle NO_x	29.5	31.2	30.5	33.9	42.2
		Total NO_x	67.6	91.7	104.7	125.4	132.7
		NO_2 level	0.15	0.202	0.230	0.275	0.291
ARB-DMV Data	D-100 Projection	Vehicle NO_x	20.5	19.5	19.0	20.8	23.2
		Total NO_x	58.6	77.7	90.0	106.4	103.7
		NO_2 level	0.15	0.198	0.228	0.269	0.262
Adjusted ARB-DMV Data	County Composite Projection	Vehicle NO_x	20.5	21.4	20.7	23.0	28.4
		Total NO_x	58.6	81.9	94.9	114.5	118.9
		NO_2 level	0.15	0.208	0.240	0.289	0.300

NOTES AND SOURCES:

Alternative VMT and population projections presented in Table IV of Appendix A-7.

NO_x = Oxides of Nitrogen. Motor vehicle and total NO_x emissions given as tons per day, annual average (values taken directly from or calculated using Tables III through VIII of Appendix A-7).

NO_2 = Ambient Nitrogen Dioxide level in parts per million (ppm) by volume (see Appendix A-4). California 1-hour ambient air quality standard for NO_2 = 0.25 ppm

Projected Max-Hour NO_2 potential based on unmodified "rollback" technique:

$$AQ_{fy} = B + (AQ_{by} - B) \times \frac{E_{fy}}{E_{by}}$$

Where: AQ = Ambient air quality (ppm)
B = Natural background pollutant level; 0.004 ppm (California Air Resources Board, 1974a)
E = Emissions of precursor pollutant; NO_x emissions, tons per day
by = Base year; 1974
fy = Forecast year

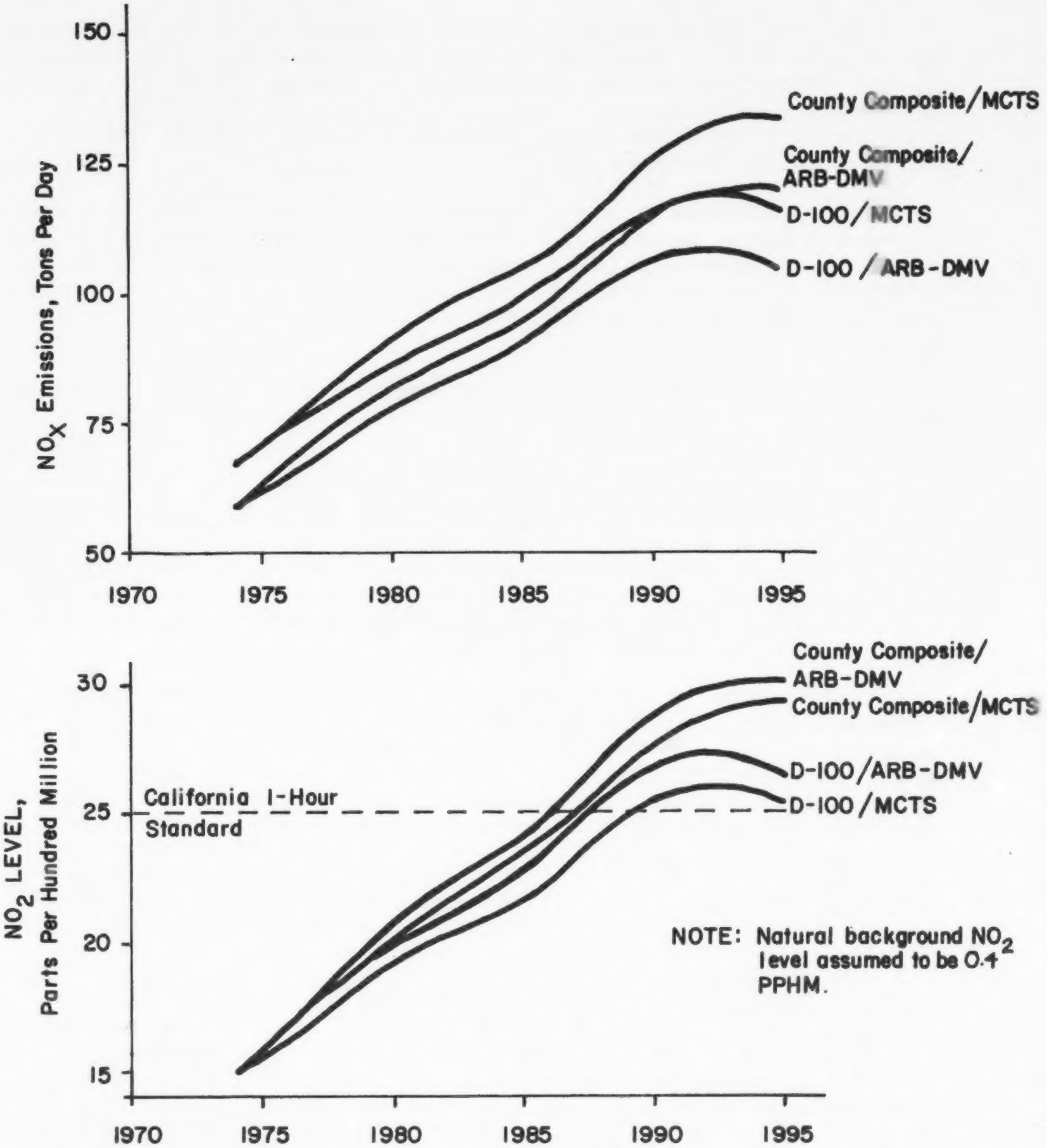
the 1973 annual report of the California Air Resources Board. This value correlates with the upper value for background NO_2 levels reported in Table A of Appendix A-1. The base year used (1974) had both the highest reported NO_2 reading and the highest ratio of observed NO_2 level to estimated NO_x emissions.

The data from Table 48 is presented graphically in Figure 45. This indicates that there is a definite potential for the California 1-hour NO_2 standard being exceeded in Monterey County from about 1987 on. Assumptions regarding either future VMT or future population levels in Monterey County will have relatively little influence on projected NO_2 levels until after 1990. This is due to the fact that the Moss Landing power plant is and will remain the source of about 30 to 40 percent of all nitrogen oxide emissions in the county. Power generation at this facility will be determined more by levels of development throughout much of northern California than by growth rates in Monterey County.

Recognizing that the preceding material deals with estimated air pollution potential, not actual forecasts of future air quality in specific years, the above discussion can be summarized as follows. Oxidant levels are projected to decline by 15 to 20 percent during the 1974-1990 period and increase by 8 to 10 percent during the 1990-1995 period. Nitrogen dioxide levels are projected to increase by 65 to 100 percent over the 1974-1995 period. Tables 47 and 48 indicate that state and local agencies should consider recommending Monterey County for designation by EPA as an air quality maintenance area (AQMA) with respect to photochemical oxidants, and perhaps also for nitrogen dioxide.

If such a recommendation were made by ARB and the formal designation adopted by EPA, an air quality maintenance planning program would be initiated in Monterey County. Assuming that procedures used elsewhere in California were followed, advisory and technical committees would be designated to reevaluate air quality problems. If this evaluation verifies that the county qualifies as an air quality maintenance area, additional committees would formulate and evaluate potential measures which could result in achievement and maintenance of air quality standards. These committees usually include representatives of local government, special districts, business and industry and various citizen groups.

A reevaluation of future air quality in Monterey County would provide an opportunity to assess various subareas of the county (such as the upper Salinas Valley, the lower Salinas Valley and Monterey Bay, and Carmel Valley).



NOTE: Natural background NO_2 level assumed to be 0.4 PPHM.

FIGURE 45 PROJECTED NITROGEN OXIDE EMISSIONS AND RESULTANT POTENTIAL NITROGEN DIOXIDE LEVELS ASSUMING ALTERNATIVE POPULATION VMT FORECASTS.

Such an evaluation of county subareas could be performed by using either a modified rollback analysis or a variation of the simple diffusion methodology of Hanna (1971). The possibility of pollutant influx from the San Francisco Bay area (either over the ocean or from the Santa Clara Valley) might also be investigated.

The potential maximum oxidant and nitrogen dioxide levels presented above have been discussed in terms of adopted state and federal health-related standards. The pollutant levels involved also have implications for agricultural crops important to the economy of Monterey County and California as a whole.

Both existing and potential oxidant levels are sufficiently high to cause either visible injury or yield reductions in sensitive crops. Detwyler (1972) cites oxidant values of 0.03 ppm for a 4-hour period as being a threshold for producing visible injury. Horsman and Wellburn (1976) cite several studies in which oxidant levels of 0.02 to 0.05 ppm for 2-3 hours produced various biochemical effects which might be expected to affect plant productivity. A 1-hour exposure to 0.10 ppm of ozone will often produce visible injury symptoms in such crops as spinach, tomatoes, pinto beans, oats, potatoes and muskmellon (Heath, 1975).

Nitrogen dioxide by itself is not very toxic to most plants. Few effects have been reported for even the most sensitive crops (peas, alfalfa, clovers, carrots, lettuce, oats, etc.) at exposures of 1.0 ppm for 24 hours (Taylor, et.al., 1975). The combination of sulfur dioxide and nitrogen dioxide at levels well below 1.0 ppm each for 1-4 hours can, however, produce significant damage to sensitive crops (Reinert, Heagle and Heck, 1975). A second major concern regarding nitrogen dioxide levels involves the role of nitrogen oxides in the formation of photochemical oxidants (see Appendix A-1).

Mitigation of Growth-Related Air Quality Impacts. The rollback formula presented in Tables 47 and 48 can be used to determine an approximate emissions threshold correlated with the appropriate ambient air quality standard. Assuming a natural background oxidant level of 0.005 ppm, a 30 percent reduction in 1974 reactive hydrocarbon emissions will be necessary to achieve the federal primary oxidant standard. Reactive hydrocarbon emissions in Monterey County should be held to a level below 50.12 tons per day in order to achieve the federal oxidant standard, assuming that the MCTS values are the best estimate of current and future VMT. If the ARB-DMV values are assumed to be a more accurate estimate of current and future VMT, the reactive hydrocarbon emission threshold should be set at 39.04 tons per day. Similar emissions thresholds for oxides of nitrogen are 113.90 tons per day using MCTS VMT levels and 98.74 tons per day using ARB-DMV VMT levels. Figures 46 and 47 graphically illustrate the relationship of the reactive hydrocarbon and nitrogen oxide emissions projections to the emissions thresholds identified above.

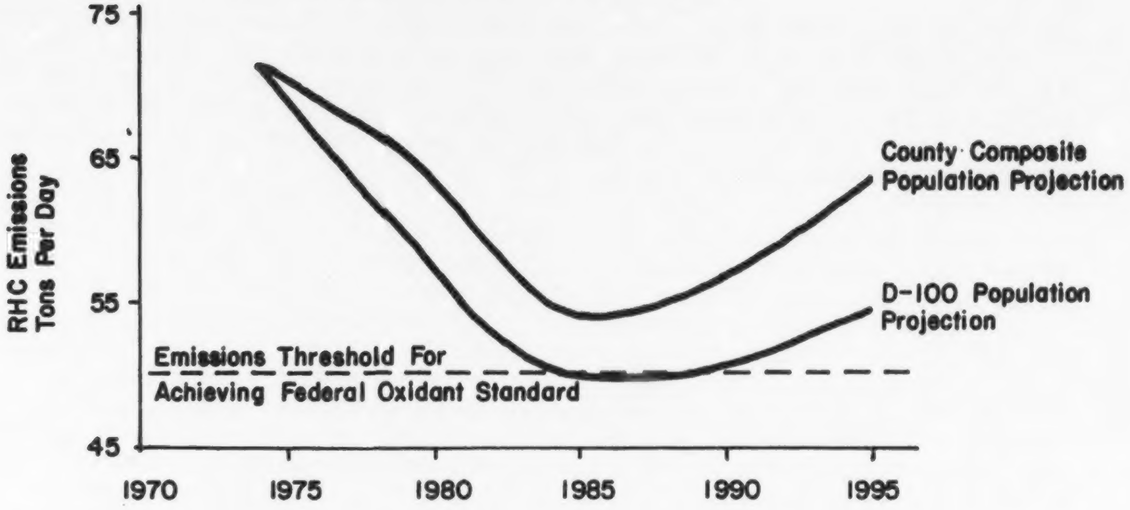
Measures to achieve the emissions reductions identified above will require action by a large number of agencies. The Monterey Peninsula Water Pollution Control Agency lacks the legal authority to implement most of the measures which might be required. Those actions which MPWPCA might implement will have serious implications for the programs and activities in which other local agencies (especially city and county governments) are involved. But because it is a regional agency which provides service to local cities and unincorporated areas, MPWPCA is in a position to work with those local governmental agencies which can implement a variety of measures to mitigate the air quality impacts of continued development.

At the present time it is unclear if adequate institutional arrangements exists to ensure implementation of measures adequate to achieve the required air pollutant emissions reductions. Local agencies could develop and implement a program of mitigation measures on an individual basis or perhaps under the auspices of AMBAG. Designation of Monterey County as an air quality maintenance area would, however, provide a more definite mechanism for resolving this institutional issue. The following discussion identifies a variety of measures which collectively or individually might result in emissions reductions adequate to achieve and maintain the health-based ambient air quality standards for oxidants and nitrogen dioxide.

The primary actions which the MPWPCA could directly undertake involve reduced sizing of the proposed project or developing a program to limit the rate of flow increases to the treatment plant. Both of these actions would be intended to limit the rate of development in northern Monterey County to a level which would assure attainment and maintenance of the health-based air quality standards.

Either of the above actions would require coordination and cooperation from Monterey County and all of the cities in the project area to assure that the altered facility sizing or adopted flow limitations would be recognized and used as constraints on the amount and rate of future development. Reduced sizing of the proposed project would be the most direct means of assuring that the proposed project would not foster conditions which would interfere with attainment of air quality standards. The underlying assumption for such an action is that lack of capacity in the proposed facilities would in fact limit the rate

MCTS FORECAST OF VMT LEVELS



ARB - DMV FORECAST OF VMT LEVELS

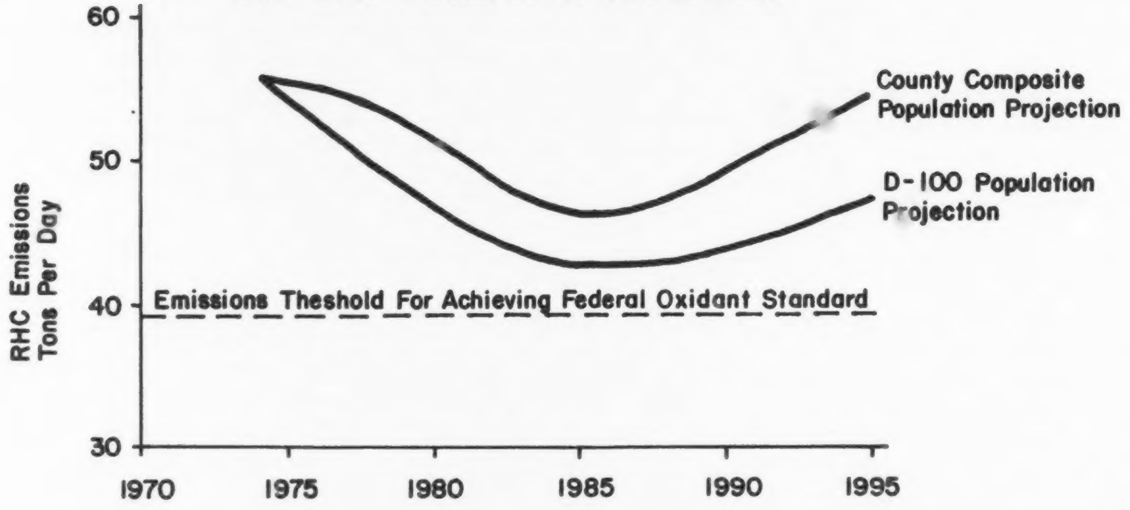


FIGURE 46 REACTIVE HYDROCARBON EMISSIONS PROJECTIONS BASED ON ALTERNATIVE VMT FORECASTS

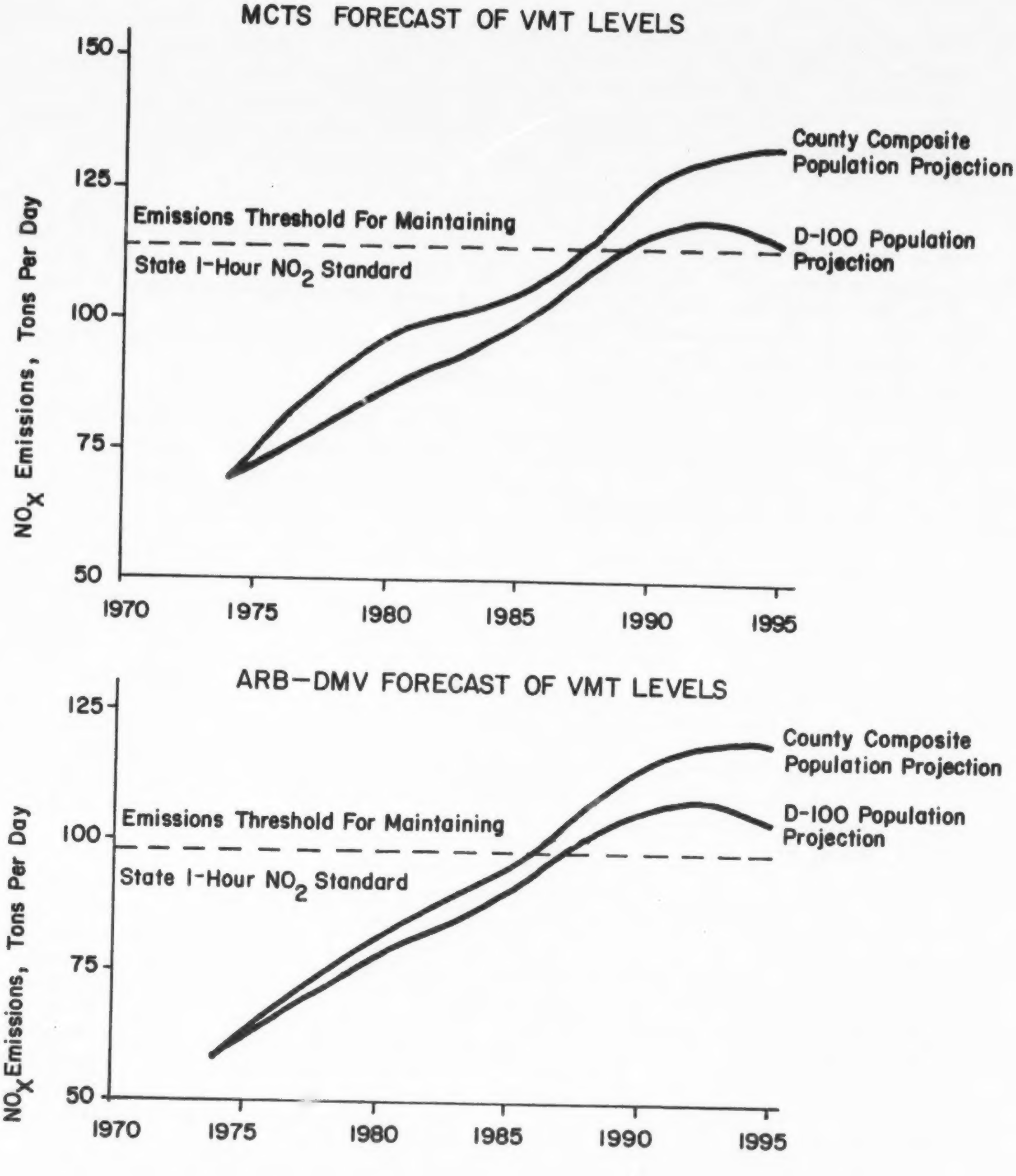


FIGURE 47 OXIDES OF NITROGEN EMISSIONS PROJECTIONS BASED ON ALTERNATIVE VMT FORECASTS

and amount of development in Monterey County to a level significantly below that presently anticipated by local planning agencies. This approach would be ineffective if alternative means of wastewater treatment and disposal were economically available, or if development pressures simply shifted to other areas in the county outside the project service area.

The flow limitation procedure is one being considered by the SWRCB in areas currently designated as air quality maintenance areas. It is uncertain if this procedure would be considered for the MPWPCA project, since Monterey County is not presently a designated AQMA. The flow limitation would be imposed through the following type of condition on the award of Clean Water Grant funds to MPWPCA.

> "Grantee agrees the average dry weather flow of wastewater to be treated and/or conveyed by the proposed project (system) will not exceed _____ MGD for a period of ten years after the date of concept approval, unless, prior to that time:
>
> (a) There is a demonstration to the satisfaction of the State Air Resources Board that adverse air quality impacts related to flows in excess of the above limit are mitigated; or
>
> (b) An Air Quality Maintenance Plan is developed and approved by the state.
>
> [illegible] commitment of treatment or conveyance in excess of the above limitation shall be made by the grantee during the period while the flow limitation is in effect." (California State Water Resources Control Board, 1976).

This approach has not yet been formally accepted by EPA as an adequate means of mitigating the indirect air quality impacts of a project. Grant funds for treatment plant facilities are awarded on a 10-year capacity basis (as determined by the Department of Finance D-100 projections) in order to equitably distribute limited federal and state funds among numerous projects. Thus acceptance of the flow limitation procedure implies a recognition that measures other than growth limitations will, within a 10-year time frame, prove adequate for achieving and maintaining ambient air quality standards.

Potential legal problems for implementing a flow limitation condition to the proposed project have not been thoroughly investigated. Service contracts between MPWPCA and the local agencies served by the regional treatment plant might require revisions to allow implementation and enforcement of any flow limitation.

The following discussion identifies measures which other local, state or federal agencies could utilize to mitigate the air quality impacts of continued development in Monterey County.

The data in Tables 47 and 48 (see also Appendix A-7) indicate that mobile sources are currently the major emitters of both reactive hydrocarbons and nitrogen oxides. By 1980, stationary sources will become the major source of nitrogen oxide emissions. By 1990, stationary and miscellaneous area sources combined will about equal mobile sources in emissions of reactive hydrocarbons. These factors must be considered in developing a program to mitigate the growth-related impacts of the project.

Stationary source emissions can be approached on two levels: imposing increasingly stringent emission regulations; and denying approval of significant new stationary sources of air pollutants. Regulation of stationary source emissions is primarily the responsibility of the local Air Pollution Control District. The major existing stationary sources of reactive hydrocarbons are petroleum marketing operations, pesticide use and solvent-using industries. The major stationary sources of nitrogen oxide emissions involve power plants and industrial fuel combustion.

Stationary source reactive hydrocarbon emissions could be reduced through such measures as reduction in the use of organic solvents containing volatile reactive hydrocarbons (curtailment of use or substitution of other solvents); catalytic oxidation, carbon adsorption, or incineration of organic solvent vapors from paint spray booths and other sources; increased use of gasoline vapor recovery systems at gasoline storage facilities; or reductions in gasoline volatility through the use of chemical additives or changes in gasoline composition. The technical, legal and economic problems of implementing these measures would require careful study.

Reductions in stationary source nitrogen oxide emissions would probably involve modification of industrial and power plant boiler operations, flue gas recirculation, etc.

City and county governments and the local air pollution control district have significant control over the development of new industrial sources of pollution. City and county general plans, zoning ordinances, and conditional use permit procedures provide several mechanisms for controlling the type and location of new industrial sources which might become established in Monterey County. The local air pollution control district must set emissions limitations and issue permits to construct and operate such new stationary sources. Permits for construction and operation of new stationary sources can be denied by the APCD if emissions from the proposed source would violate emissions limitations or interfere with attainment or maintenance of ambient air quality standards. ARB could also become involved in the review of proposed stationary sources, since it exercises oversight responsibilities regarding local APCD activities. New source emission standards for certain types of industries have been set by EPA, although local APCDs and ARB have primary implementation responsibility.

Any action taken to deny or impede the development of new industry will alter the future economic base of the county and any affected city. This change will affect the amount of new development which should be anticipated in the county, implying a reduction from current land use, population and wastewater flow projections.

The U. S. Environmental Protection Agency, the California Air Resources Board and local governments all have significant roles in devising programs to reduce motor vehicle emissions. The EPA and the ARB have direct regulatory control over vehicle emissions. The effects of existing vehicle emission control regulations are incorporated into the projections of future emission levels presented in several preceding tables and figures. As can be seen from Table 47, motor vehicle reactive hydrocarbon emissions are expected to decline from current levels. What the table does not show is that by 1980 or 1985 evaporative emissions of hydrocarbons (from hot engines) will be as important as exhaust emissions (California Air Resources Board, 1976b). As such evaporative emissions become more important, reducing the total number of vehicular trips will become as important as reducing the total vehicle miles traveled. The emission factors used to develop the data in Table 47 incorporate these evaporative emissions on a VMT basis, not on a vehicle trip basis.

While it is possible that future technological improvements will allow control of reactive hydrocarbon emissions beyond the level specified by current standards, there is no way at present to quantify this potential reduction. Action to require implementation of such new technology would be the responsibility of the ARB and EPA.

A major shift in vehicle fuels (such as to propane or alcohol-based fuels) could produce important reductions in reactive hydrocarbon emissions, but such a change appears highly unlikely in the near future.

City and county governments can play a key role in controlling future mobile air pollution sources through modifications to general plans, zoning ordinances, and conditional use permit procedures. These land use controls can be used to guide the pattern of residential, commercial and industrial development in such a way as to minimize motor vehicle use.

General plans could be revised to redirect the type, amount, location and rate of development in a manner which will assist in achieving or maintaining air quality standards. In addition to possible political difficulties in achieving such a comprehensive reevaluation of local general plans, there are practical difficulties of accurately estimating the air quality consequences of plan revisions and of devising procedures to ensure implementation of air quality goals.

Local planning agencies can play an important role in controlling vehicle travel through regulation of land use patterns. Numerous measures to reduce mobile source emissions are possible. Some of the major ones which could be important individually or cumulatively are discussed below.

General plans should be reviewed and modified as necessary to ensure that any new employment centers will be near the probable residential areas for most employees. This action would reduce VMT for job-related trips. This approach could be implemented by city and county governments through normal general plan review processes. Implementation of these initiatives should not be very difficult, but their enactment would produce only a minor decrease in overall VMT levels.

General plans could also be reviewed and modified as necessary to provide for higher density or clustering of residential development, with neighborhood and community rather than regional commercial centers. This could reduce the length of local trips (to shopping, school, parks, etc.). In conjunction with several of the following measures, this planning procedure offers the potential for a modest or perhaps significant reduction in vehicular trips and VMT. This step could be implemented by city and county governments through normal general plan and development review processes. However, its implementation may generate local controversy, especially in areas which are trying to maintain a rural residential atmosphere.

New residential areas and their associated roadways can be designed to facilitate bus service. Roadways can be designed with bus turnouts at appropriate locations. Higher density developments and linear development clusters are most efficiently served by bus systems (as opposed to extensive lower density tract development). The influence of urban form on the costs of other urban services and on VMT levels for those who travel by private auto must also be considered. Total vehicular trips and VMT can both be reduced by this measure. The extent of such reductions will depend greatly on the effectiveness of the transit system operating in the area and on the existing "urban form" of the area. This measure can be implemented by city and county governments through general plan and specific development review processes. Coordination should be maintained with the agency which is to be responsible for transit service.

Neighborhood circulation systems should be designed to emphasize pedestrian and bicycle modes of circulation for intra-neighborhood travel (i.e., to schools, parks, and local commercial areas, etc.). This has the potential for a modest reduction in vehicular trips and VMT. Implementation may require changes in the policies of local general plans and will require careful evaluation of specific development plans at the local level. There may also be a potential for increasing the convenience of pedestrian and bicycle travel in existing developed areas.

Community-wide bicycle circulation systems should be developed to meet inter-neighborhood travel desires (trips to local employment centers, certain types of shopping, schools, parks, etc.). The effectiveness of this proposal would probably be dependent on local attitudes toward nonvehicular travel as well as on the convenience of the facilities provided. Any shift from vehicular to nonvehicular travel modes, however, will be important to achieving air quality goals. Implementation will require planning and capital improvement actions by local government. There may be a potential for technical assistance and funding from other levels of government.

Existing public transit systems could be expanded and improved to attract greater ridership. Such systems must meet both inter-city and intra-city travel desires. The system would have to be both convenient and low cost (i.e., subsidized) to be effective. Planning of the system should recognize both employment and shopping travel patterns. Attention should also be given to meeting travel demands associated with major recreational facilities or areas. Experience elsewhere indicates that an efficient transit system has the potential for attracting 10 percent (or perhaps more) of the total travel demand in an area (U. S. Environmental Protection Agency, 1974). A much higher percentage attraction is possible during the morning and evening commute hours.

State agencies (CalTrans) and local government could provide technical and administrative support service for car pool formation. Assistance to major employees in organizing employee car pools might be the most effective procedure. Programs such as those developed by the 3M Company of St. Paul, Minnesota might also be instituted.

Local cities could take action to increase the cost or restrict the availability of parking at certain employment or shopping areas, giving cost advantages or priority to car pools. Local employers could be encouraged to take similar actions. Major attempts to implement such measures would probably generate significant local opposition.

Large employers could be encouraged by local agencies to utilize staggered working hours. This would reduce current peak-hour traffic volumes and spread higher traffic flows over a longer period of time. It is uncertain what effect this would have on daily peak oxidant levels.

Large employers might also be encouraged to utilize a staggered 4-day work week. This would reduce employment-related trips and VMT, but might lead to increased shopping and recreational travel. The net effect of such a measure is uncertain at present.

Vegetation and Wildlife

Wastewater treatment service areas are projected to be expanded in several portions of the study area as a result of the project. These include Prunedale and Castroville, Moss Landing, the Monterey/Salinas corridor (Del Rey Oaks, Toro area on Highway 68), the outskirts of Salinas and Marina.

Future development within these portions of the service area would result in impacts on existing vegetation and attendant wildlife. Vegetation would be removed from developing areas. Adjacent lands would be subjected to heavier human use. This characteristically results in loss of vegetation through trampling, use of off-road recreational vehicles and cutting for firewood or clearing for a variety of reasons. Increased runoff from paved and builtup areas often accelerates erosion and leads to removal of or a change in vegetation in adjacent areas.

Wildlife populations are most seriously affected by the loss of habitat. The area available for shelter, feeding and reproducing is reduced, forcing some animals to relocate into adjacent areas. This increases population density and competition for food and living space, and often results in an overall reduction in numbers of animals. Some habitats are in shorter supply and therefore more critical than others (i.e., salt marsh, riparian vegetation coastal dunes). Increased human use of lands adjacent to new developments also affects the more timid and secretive wildlife species. Changes in local drainage patterns and contents of overland runoff created by development can be major influences on the quality of riparian and marsh habitats downslope.

Five vegetative types would likely or may be impacted -- agricultural (cultivated), woodland/grass, coastal dunes, riparian and coastal salt marsh.

Agricultural. Key agricultural lands are located adjacent to Salinas, Castroville and Prunedale. Most of these lands are in cultivation and have little natural vegetation, but do have periodic use by wildlife.

Woodland Grass. Woodland and woodland/grass vegetative types are scattered throughout the service area. The greatest impacts on woodland areas resulting from growth would be in the Monterey and Salinas corridor (Highway 68). Oak woodland ranks as an important habitat for wildlife in terms of species diversity and population numbers. Encroachment into this habitat type by residential and/or commercial development will reduce local populations of wildlife and reduce the value and use by many seasonally abundant species.

Coastal Dunes. Projected service area expansion could include some coastal dune habitat north of Marina and south of Moss Landing. Any development in this habitat could impact small mammals (blacktailed jackrabbits, brush rabbits, Microtus) and bird fauna utilizing the dunes and beach areas.

Riparian. Riparian habitat borders the Salinas River along most of its length within the study area. The greatest potential impact on riparian vegetation would be on the south side of the river in the Toro area along Highway 68. Riparian woodland represents a valuable habitat to wildlife because of vegetative variety and the close proximity to water. Any encroachment into riparian areas would reduce species diversity and population numbers.

Coastal Salt Marsh. The potentially expanded service area at Moss Landing would abut salt marsh habitat at Elkhorn Slough and Old Salinas River. Much of the land surrounding Elkhorn Slough has already been converted to non-resource use -- urban development and commercial and industrial uses. Any further land use changes within or immediately adjacent to salt marsh areas would affect the existing wildlife values and habitat for numerous species of waterfowl and shorebirds and invertebrate life forms.

Several rare and endangered vertebrate species could be impacted by population growth and urban or commercial development. The California clapper rail is a resident of salt marsh habitats at Elkhorn Slough, while the brown pelican and least terns are migrants, seasonally utilizing the habitat provided by Elkhorn Slough. The Santa Cruz long-toed salamander inhabits vernal pools in the Moss Landing area. Any disturbance of these pools could reduce available habitat and population numbers. Urban encroachment into the sand dunes between Monterey and Marina could further reduce the habitat and viability of the Smith's blue.

Numerous rare and endangered plant species occur throughout the study area, some of which likely occur within the expanded service areas. Many of these species are associated with coastal sand dunes and the coastal strand.

Mitigation or avoidance of growth-related impacts on vegetation and wildlife is best achieved through the land use planning process. Within northern Monterey County, this planning is primarily the responsibility of the incorporated cities, Monterey County and the California Coastal Zone Conservation Commission. Official land use plans and accompanying zoning restrictions are responsible for identifying appropriate land uses and regulating the pattern of future land development. These plans should take into consideration the existing pattern of vegetation and wildlife habitat within the study area and provide appropriate protection from changes in land use within and adjacent to those vegetation and habitat types found to be worthy of such protection. Habitats that include rare or endangered species of plants and animals (coastal dunes, salt marsh, freshwater marsh), habitats in limited supply (salt marsh, riparian areas) and habitats that support unusually diverse or exceptionally large numbers of species (salt marsh, riparian areas) should be specifically identified and a mechanism should be established to insure their protection. The California Coastal Zone Conservation Commission has identified many of the study areas valuable coastal habitats in their Coastal Plan and has identified methods for their protection.

Growth-related increases in erosion, stream siltation and urban runoff can also affect vegetation and wildlife. These secondary impacts must be controlled on a local level through strict enforcement of grading ordinances, required control of runoff from construction sites, and improved methods of either controlling, reducing or improving the quality of urban runoff. AMBAG is currently conducting a 208 study of non-point source pollution in the Monterey-Salinas area. This study should identify means of reducing the impacts of erosion and urban runoff on water quality, and therefore wildlife and vegetation.

The specific impacts and ramifications of population growth and development on wildlife and vegetation must also be analyzed in impact reports for each new area developed in the future.

Resource and Energy Use

Continued growth entails the use of many different resources. Most mineral and energy resources are essentially nonrenewable. Other resources, such as food, timber, water and wildlife are renewable if used and managed properly (renewable resources are capable of being naturally replaced in a reasonably short period of time). The extraction, harvesting and processing of resources produces a variety of environmental effects. Maximizing the production of renewable and nonrenewable resources to better support continued growth entails social and environmental costs.

Mineral extraction and timber harvesting reduce the recreational, aesthetic and wildlife values of the land involved through clearing of vegetation and scarring of the landscape. Runoff from extraction areas often pollutes waterways and destroys fisheries habitat. Use of materials for construction of structures roadways, etc. preempts alternative land or resource use. If the resource is nonrenewable, the supply available to future generations is also reduced.

If growth in the proposed facilities service area proceeds as projected (Table 45), annual residential natural gas usage and electrical consumption will increase proportionally (assuming per capita consumption rates remain the same). Commercial and industrial energy use should increase at a similar rate, even though it is difficult to project the type and amount of commercial-industrial development that will occur in the study area. The larger populations will also require increased energy supplies for transportation. If residential development proceeds as projected in county and local plans, the new residents will, on the average, live further from their jobs than is now the case. Development in the Castroville-Prunedale area, the Monterey-Salinas corridor and the outer edges of Salinas will require higher per capita commute distances to the job market areas. All of these increases in energy demand will in turn require additional development of renewable and nonrenewable energy resources; most of these resources are currently being tapped outside the study area.

If local water supply shortages are not solved locally through increased development of existing surface and groundwater, increased use of reclaimed wastewater or improved water conservation efforts, water will have to be imported from other drainage basins to meet the needs of the increasing population. This will in turn require major expenditures of energy and construction materials to develop a delivery system and transport the water into the area.

Resources other than energy are also required to support development. Lumber and forest products, sand and gravel and a variety of other construction materials go into building houses, roads and service establishments for new residents. Sand and gravel and clay products are extracted and manufactured within the county, while wood and metal products are generally imported.

These potential impacts on energy and resource supplies can be controlled to a degree by initiating simple conservation-oriented planning policies on a local scale. This could include incorporating energy conservation requirements into building codes, encouraging local mass transit systems, encouraging urban areas in-filling rather than urban sprawl, publicizing household-oriented energy and resource conservation techniques in schools and the local media, conducting local energy education campaigns and utilizing local rather than imported resources (water, gravel, etc.) as much as possible.

Aesthetics

The major adverse aesthetic impacts normally associated with urban expansion include removal of vegetation, obstruction of previously natural vistas, elimination of open space and the slow accumulation of noises, odors and aerial contaminants that come with many residential, commercial and industrial areas. If growth in the study area follows the directions indicated in local and county plans, aesthetic impacts will be felt in a variety of locations.

The Monterey-Salinas corridor, the Castroville-Prunedale corridor and the undeveloped lands surrounding Marina and Salinas are likely targets for new development. The Monterey-Salinas and Castroville-Prunedale corridors are already changing from rolling, tree-covered thoroughfares to low density residential suburbs. If water and wastewater services continue to be made available in these areas, the conversion of the landscape will probably continue. County and City of Monterey General Plans indicate development in the Toro Park and Monterey II areas will continue well beyond the boundaries of existing development. This is also evidenced by the boundaries of this project's service area. New zoning designations in the

Castroville-Prunedale corridor require extremely large lot sizes due to the poor soil and groundwater conditions and their effect on septic tank use.

Urban expansion on the Marina and Salinas outskirts would have a less pronounced effect on regional aesthetics. These areas are currently dominated by a combination of urban and agricultural activities that exist in close proximity to one another.

Sewering of the Moss Landing area, which is planned as a subpart of the north Monterey County Facilities Plan, may slightly alter the scenic character of that community. The facilities are being planned for a relatively small population increase, but the present rural atmosphere may give way to a more suburban setting with residential and commercial in-filling.

These potential impacts of growth require no mitigation if changes from rural and open space settings to suburban landscapes and increases in urban densities are considered aesthetically desirable. However, if one considers open space and lower development densities to be more pleasing, many of the aesthetic impacts can be reduced while still experiencing growth. Controls on the location, type and extent of residential and commercial structures through zoning restrictions can have a significant effect on aesthetics.

Building setback restrictions, tree cutting ordinances, landscaping requirements and architectural style recommendations are also tools that can be used to influence the aesthetics of developed areas. The use and effectiveness of these mitigations is dependent upon the policies and actions of the County Planning and Public Works Departments and the Board of Supervisors. The county's Open Space Element (Monterey County Planning Commission, 1972) includes broad policy statements designed to protect the natural, aesthetic values of the county's open land. The California Coastal Plan also includes recommendations for maintenance of the scenic coastal corridor. Strict application of these recommendations should mitigate many of the aesthetically undesirable potential impacts of development.

SUMMARY ANALYSIS OF ALTERNATIVES AND RECOMMENDATIONS

The following paragraphs briefly summarize the impacts of the various alternative pipeline routes, treatment plant sites and complete wastewater treatment and disposal systems. Recommendations of most acceptable alternatives are made where appropriate.

Pipeline Routes

Alignments A1 and A2

The possible destruction of rare and endangered plants on Ft. Ord is the major adverse environmental impact likely to be created by construction on Alignments A1 and A2. Neither alternative avoids the identified plant locations; therefore, this particular impact should not play a role in deciding between the two routes. However, close field inspection and control of construction activity in the potential impact areas is called for if construction is to follow either route. The major traffic and commercial business disturbances created by excavation along Del Monte Boulevard appear to be the most significant environmental consideration in choosing between Alignments A1 and A2. The minor habitat loss and wildlife disturbance created by construction on A1 can be mitigated and is of less magnitude than the traffic impact created by using Alignment A2. Therefore, A1 appears to be preferable.

Alignments B1 and B2

There appears to be very little difference in the environmental impacts of using Alignments B1 and B2 except that route B2 may encroach on an area inhabited by a rare species of plant. If B2 is to be used, a detailed site investigation should be conducted to verify the presence or absence of the rare plant. If the plant is present, route B1 should be used. If it is absent, either route should be acceptable.

Alignments C1 and C2

There are no alternatives to Alignments C1 and C2.

Alignments D1 and D2

Temporary traffic, commercial and residential disruptions are the major environmental problems associated with Alignments D1 and D2. It appears that route D1 through Marina is superior to D2 in that significant traffic and residential disruptions and the possible loss of a number of large trees would be avoided in favor of construction between the highway and the railroad track (D1), which would create only a moderate traffic problem on State Highway 1.

Alignments E1, E2, E3, E4 and E5

Rate of energy consumption and threat of pipeline damage during a seismic event appear to be the most significant long-term impacts associated with construction along these proposed routes. Alignments E3 and E4 cross the concealed Reliz-Renconanda fault in the vicinity of the Davis Road-Reservation Road junction. E1 and E4 cross it again where they turn northward just north of Marina. These routes would therefore be exposed to the greatest threat of rupture from fault offset. Alignment E2 would create short-term traffic problems along Blanco Road, but avoids the fault Route E5 avoids both the traffic problem on Blanco Road and the fault. E5 also has the lowest anticipated rate of energy consumption (see Table 29). Route E5 therefore appears to be the most acceptable for construction of a Salinas interceptor.

Alignments F1 and F2

Interference with agricultural operations would be less severe if pipeline construction followed Alignment F2 rather than F1. Therefore, it appears that route F2 is more acceptable than route F1.

Ocean Outfall (Land Portion)

Four land-basedocean outfall routes have been proposed (see Figure 32). Rotes 1 and 2 cross agricultural land and beach sand dunes, an border the California Department of Fish and Game wildlife are near the mouth of the Salinas River. Excavation through te dunes and disturbance to agricultural operations and wildlife can be avoided by other routes. These two routes do provid the opportunity to supply the wildlife area with treated watewater for habitat enhancement; however, water quality requirments for use in the area may exceed the expected quality of he ocean discharge, preventing this reuse. Reuse requirements sould be checked through the RWQCB and the

State Health Department. If the wastewater cannot be reused, these two routes appear to be the least desirable. Route 4 avoids impacts to the wildlife area, but a significant parcel of agricultural land would be temporarily lost and the farming operation would be disrupted if it were used. Route 3 avoids all potential agricultural and wildlife problems and follows an existing transportation right-of-way. There may be a temporary disruption of the sand mining operation at the end of the right-of-way, but this could be adequately mitigated by avoiding the existing road or by providing a temporary route to and from the site. It therefore appears that Alternative 3 is environmentally the most acceptable as an outfall alignment, pending determination of the feasibility of using wastewater on the state wildlife area.

Specific routes (and alternate routes) for the irrigation delivery pipeline of Alternatives 134, 166, 170 and 171, and the lagoon outfall of Alternative 134 have not been developed to date. The irrigation delivery pipeline route is dependent on the outcome of the agricultural demonstration project and the location of the irrigation distribution system to be utilized for wastewater reuse. The route of the lower river outfall of Alternative 134 has not been studied in detail as Alternative 134 is not the facilities engineer's recommended plan.

Treatment Plant Sites

Seismic and energy considerations, potential land use conflicts and aesthetic impacts are the most important environmental factors in choosing one of the six treatment plant sites. All six sites are predominantly open agricultural land, but the five south of the Salinas River are within the City of Marina's sphere of influence and the one north of the river is within the Castroville sphere of influence (sphere of influence being the county planning area that surrounds these communities). Sites 3 and 6 occupy prime agricultural land and are currently under cultivation. Both of these sites have been designated by local area plans for continued agricultural use (Marina Master Plan, 1967; Moss Landing Area Development Plan, 1973). Dedication of this high value agricultural land to wastewater treatment use is not desirable.

The remaining four sites are primarily grazing land. Site 4 also contains part of the Marina landfill. Soil conditions are essentially the same. Sites 1 and 2 are readily visible from both the existing and new State Highway 1 routes, while Sites 4 and 5 have areas that are screened from off-site view. Portions of Sites 4 and 5 are designated by the Marina Master Plan (Monterey County, 1967) for urban expansion, while

Sites 1 and 2 are located on land designated as industrial reserve. These future use designations may be subject to change now that Marina has incorporated. If urban development does take place in Sites 4 and 5 as the plan suggests, location of treatment facilities there may not be compatible with development, especially if residential use is involved. It is unlikely, however, that urban development will encroach on the Marina landfill site, as it is expected to become the major landfill in the north county. Wastewater treatment would be quite compatible with landfilling; the close proximity of the two would also make sludge disposal relatively inexpensive.

The general seismic data available in the Burland and Associates (1975) report indicates that seismic risks are quite uniform over the six possible plant sites with the exception of the eastern half of Site 4. This higher ground has slightly less risk of lateral spreading, vibration damage and ground rupture.

Energy consumed in pumping to the treatment plant would be highest for Site 4 and lowest for Site 1, but that consumed for pumping to irrigation in the Salinas Valley and disposing of sludge would be lowest for Site 4 and highest for Site 1. Sites 2 and 5 fall in between in each case.

Based on these considerations, it appears that locating the treatment plant on Site 4 near the Marina landfill would have the fewest adverse environmental consequences. The close proximity for sludge disposal and the possibility of sludge reuse for landfill cover, the compatibility of land uses and the general remoteness of the area are all favorable aspects. In addition, the possibility of using methane generated at the landfill for treatment plant power is increased if Site 4 is used.

Treatment and Disposal Systems

Five alternative regional wastewater plans and the no action alternative have been described and analyzed in detail in the preceding sections. Several major environmental, social and economic considerations have been identified in the process. These key potential impacts and their interrelationship with the project alternatives are listed in Table 49. This information is the basis for the comparison of alternatives which follow.

Table 49

SUMMARY EVALUATION OF ALTERNATIVE TREATMENT AND DISPOSAL PLANS

Potential Impacts	Alternatives[1]					
	1	134	166	170	171	No Action
PHYSICAL-BIOLOGICAL IMPACTS						
Archeological resources	P	P	P	P	P	N
Air quality	A	A	A	A	A	A
Soils and crops	N	P	P	P	P	N
Agricultural practices	N	P	P	P	P	N
Seismic risks	A	A	A	A	A	A
Groundwater quality	N	B	B	B	P	A
Surface water quality	B	B	B	B	B	A
Monterey Bay water quality	B	B	B	B	B	A
Water supply and reuse	N	B	B	B	B	N
Public health - water contamination	B	B	B	B	P	A
Public health - land contamination	N	A	A	A	A	N
Energy consumption in treatment and disposal of wastewater (rank)[2]	2	6	4	4	3	1
Aesthetics	B	B	B	B	B	A
Land use changes	N	A	P	A	A	N
Salinas River biota	A	P	A	A	A	N
Salinas River lagoon biota	P	B	P	P	P	P
Marine biota	B	B	B	B	B	N
General construction impacts (rank)	A	A	A	A	A	N
ECONOMIC IMPACTS						
Construction cost (rank)	3	5	4	6	2	1
Operating cost (rank)	2	6	3	5	3	1
Local cost (rank)	3	5	4	6	2	1
Overall cost (rank)	3	5	4	6	2	1[3]
SOCIAL IMPACTS						
Growth inducement - accommodation	A	A	A	A	A	N
Local acceptance	A	P	P	P	P	A

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[1] Key:

B Beneficial
A Adverse
P Problematical (unknown or open to question)
N None

[2] Comparative ranking from most acceptable (#1) to least acceptable (#6) alternative.

[3] Ranking does not consider possible economic penalties for noncompliance with RWQCB NPDES permits.

The main objective of the north Monterey County facilities planning effort has been to find a solution to existing water quality and public health problems being created by existing wastewater systems. At the same time, methods of alleviating groundwater quality and quantity problems in the study are being sought. The solutions must be implementable, locally acceptable and cost effective. Therefore, the water quality and public health implications of the project alternatives and their social, economic and environmental costs, are vital to selection of the most appropriate alternative.

Each of the five proposed regional alternatives would solve the major public health and water quality problems associated with existing wastewater discharges. The no action alternative would perpetuate the problems. Alternative 1 would relocate all discharges to central Monterey Bay where new problems are not likely to develop. The four reclamation alternatives would discharge effluent to various land or surface water areas, with varying potentials for creating new water problems. The two storage alternatives (170 and 171) would apply the most wastewater to croplands and therefore have the greatest risk of eventually degrading the surface aquifer in the lower Salinas Valley and increasing quality problems associated with agricultural runoff. They also have the best potential for reducing water supply and salt water intrusion problems. Alternatives 134 and 166 would apply less wastewater to croplands, but would require nonirrigation season discharges to surface waters. The Alternative 166 discharge to the bay would be less likely to create a surface water quality or public health problem than the Alternative 134 lower Salinas River discharge, even though the river discharge would probably improve river and lagoon water quality in low flow periods. Despite these potential new problems, the reuse aspect of the four reclamation options is a significant environmental benefit to the water-short study area; this is of major importance in selecting a final project.

There are several other areas of impact that are important to the selection process and therefore need to be mentioned. The first is impact on the area's flora and fauna. All five of the proposed regional alternatives would have an adverse but mitigatible effect on fish, wildlife and vegetation along the lower Salinas River from removal of the Salinas discharges. Because each alternative, except no action, has the same effect, this will not play a role in selecting a best project. Alternative 134 could, however, benefit the fish and wildlife resource in the Salinas River lagoon by providing a large freshwater source during the nonirrigation season.

The major social and economic considerations include cost of the new system, impact on existing land uses and general public acceptability. No action appears to be the cheapest option at the outset, but fines for noncompliance with RWQCB discharge permits would ultimately make this choice economically prohibitive. Beyond that, Alternative 171 would have the lowest cost over a 20-year period, with Alternative 1 a close second. Alternative 166 costs are approximately $11-$13 million higher than 1 and 171 for the construction phase. Alternative 134 is $5-$13 million more costly than 166 in the construction phase. Alternative 170 has by far the highest cost.

While no action and Alternative 1 would have little impact on land use, the four reclamation alternatives could have a significant impact on agriculture in the Castroville area. Long-term use of wastewater for irrigation could adversely affect the viability of soils and require costly changes in farming practices. Crop marketability could also be adversely affected. In contrast, the new water source could prolong the viability of farming in areas that are facing a rapid deterioration in the quality of existing groundwater supplies. These impacts would be studied in detail through a pilot project prior to initiating full-scale irrigation reuse.

Alternatives 170 and 171 would displace large acreages of open space for storage/percolation areas. These new uses could conflict with urban expansion planned in the Marina area.

Finally, public acceptance must be considered. This includes both the local general public and public regulatory agencies. All five alternatives can meet regulatory agency legal requirements, but some are more compatible with unofficial public goals than others. The irrigation options involve public health questions that concern both state and county health departments, and soil and crop damage questions that concern the agricultural community. There is, however, strong public support for beneficial reuse of the wastewater. State and federal law strongly support reclamation. Ocean disposal without the potential for reuse would not have this strong support. River disposal also raises public health questions that block full support from health agencies. The public health and agricultural questions could be resolved through demonstration projects prior to implementing a plan, however. Project cost may in the long run prove to be the deciding factor in public acceptance.

Recommendation

Of the six plans analyzed above (including no action), the soundest from an environmental standpoint may actually be a combination of elements from several. Regional interceptors and a central treatment plant are an acceptable framework for the system. Reuse through irrigation should also be a part of the system. Therefore, the agricultural demonstration project (see Significant Issues to be Resolved section) should be initiated as soon as possible to resolve agricultural and public health questions. Because the storage alternatives cannot be readily staged, and require large land commitments, they should not be planned as part of the initial system. Storage could be implemented as part of the other reclamation alternatives at a later date, if reclamation proves feasible and the added cost is warranted. The choice of disposal options in the interim (while the agricultural demonstration project is in progress) must be made between ocean discharge and river discharge (Alternatives 166 and 134, respectively). The ocean outfall would utilize a generally acceptable, reliable and environmentally-sound disposal method, but requires considerable capital investment. The river disposal could be beneficial to fish and wildlife resources in the Salinas River lagoon, but further analysis of river and lagoon water quality conditions is needed before the full impact of this option is known. Therefore, a decision must be reached as to whether the benefit to the lagoon is significant enough to delay a choice between ocean and river disposal and initiate a complete study of lagoon water quality.

UNAVOIDABLE ADVERSE IMPACTS

Each of the five regional alternatives would create unavoidable adverse impacts. These impacts have been described on preceding pages, and mitigation measures capable of reducing the magnitude of the impacts have been suggested where appropriate. The following table summarizes the direct and indirect unavoidable adverse impacts of construction and operation of the five systems.

Summary of Unavoidable Adverse Impacts

	Alternatives				
Impact	1	134	166	170	171
CONSTRUCTION					
Creation of local noise, dust and aerial emissions along interceptors and at plant site	x	x	x	x	x
Visual disruption at construction sites	x	x	x	x	x
Loss of vegetation and wildlife habitat to new facilities	x	x	x	x	x
Loss of non-mobile wildlife species on construction sites	x	x	x	x	x
Loss of agricultural land to new facilities	x	x	x	x	x
Temporary sedimentation in lower Salinas River or Salinas River lagoon		x	x	x	x
Temporary sedimentation in ocean waters	x		x		
OPERATION					
Slow accumulation of certain trace elements in agricultural soils		x	x	x	x
Increased salt leaching requirements in some agricultural areas		x	x	x	x
Decrease in the quality of irrigation return flows in some agricultural areas		x	x	x	x
Creation of a potential public health hazard at point of effluent discharge/reuse	x	x	x	x	x
Local increase in vector populations at wastewater storage/percolation areas		x	x	x	x
Increase in energy and chemicals required for wastewater collection, treatment and disposal	x	x	x	x	x
Increase in the volume of sewage sludge produced through wastewater treatment	x	x	x	x	x
Increase in the cost of providing wastewater treatment service	x	x	x	x	x
Fails to utilize reuse potential of treated wastewater	x				

Impact	Alternatives 1	 134	 166	 170	 171
GROWTH RELATED					
Increased pressure on local water supplies	x	x	x	x	x
Conversion of open space and agricultural land to urban uses	x	x	x	x	x
Increased pressure on public services and facilities (schools, fire and police protection, solid waste disposal, etc.)	x	x	x	x	x
Increases in urban runoff and erosion, affecting water quality.	x	x	x	x	x
Increases in stationary sources and vehicle traffic with subsequent degradation of air quality.	x	x	x	x	x
Increased demands on local energy and natural resource supplies.	x	x	x	x	x

LOCAL SHORT-TERM USES OF THE ENVIRONMENT VS. MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

All of the alternative wastewater treatment and disposal systems, including no action, involve trade-offs between beneficial and adverse impacts. Selection of the best alternative is intended to result in achieving the maximum beneficial effect at the lowest possible environmental, social and monetary cost.

The major benefit sought by each of the alternatives is the alleviation of adverse public health and water quality impacts being created by existing wastewater treatment and disposal systems in the Salinas-Monterey area. Domestic wastewater discharges to the lower Salinas River, Tembladero Slough and the shallow, near-shore waters of Southern Monterey Bay are creating occasional high bacterial counts and are adding to nutrient loads that reduce the aesthetic and recreational potential of these waters. The long-term benefit of eliminating these existing problems would be realized by both residents and visitors to the area, as well as by wildlife utilizing the present effluent receiving waters. The four wastewater reclamation alternatives (134, 166, 170 and 171) also seek to prolong the productive lifetime of groundwater supplies in the lower Salinas Valley by supplying agriculture with an alternative to continued groundwater pumping. Agricultural and domestic use of groundwater in the Salinas River basin has outstripped natural replenishment to such an extent that sea water has intruded the main water supply aquifers near the coastline. The area intruded by seawater is steadily increasing, causing abandonment of some wells and deepening of other wells; and requiring irrigation with increasingly inferior quality water. A reduction in pumping could stem the landward intrusion of sea water in the 180- and 400-foot aquifers of the lower valley. Some of the wastewater constituents (sodium, boron, cadmium) could reduce the long-term productivity of the irrigated soils, however, unless remedial agricultural practices are exercised.

Each alternative requires certain trade-offs to achieve the long-term benefits sought. The major sacrifices that are common to construction and operation of each regional alternative include the permanent dedication of open space/grazing areas to use for wastewater treatment and disposal, and the reduction of surface flows in the lower Salinas River (of consequence primarily in the dry summer months). Increased demands for power, chemical products, and the area's financial resources are also necessary. The four reclamation alternatives would extend the productive lifetime of the deeper Salinas Valley groundwater aquifers (180- and 400-foot), which are the principal source of irrigation water for the valley agricultural interests. The Salinas Valley is one of the major vegetable crop production areas in the state; the added water supply would be a positive factor in insuring the continued viability of agriculture in the Castroville area. Without additional water from some outside source, farming in the coastal portion of the valley may not continue in its present form for long as salt levels may exclude production of certain salt-sensitive crops.

The increased service area populations to be supported by the regional wastewater system will permanently displace additional open space and agricultural land. Especially significant is the loss of productive agricultural land in the Salinas and Castroville areas. The loss of prime agricultural land is not mitigatible in that high quality soils are a finite resource and cannot be created in other areas by human manipulation. The added populations will also require building material and energy resource inputs in the form of dwellings, roads, space heating and cooling and a whole variety of service-oriented structures that accompany new populations. Increasing demands on the local water supply brought on by population increases will affect the long-term productivity of existing surface and groundwater resources. The projected increases in aerial pollutants associated with regional growth could further affect crop productivity in the Salinas Valley. The oxidant levels projected in the area indicate that there may be effects on overall crop productivity.

Alternatives 1 and 166 would require 13,000 to 20,000 feet of pipe material and would remove at least 6,400 linear feet of sandy bottom marine habitat in order to place an ocean outfall into operation. Construction of an outfall would allow the earliest possible elimination of existing bay and river discharges, but it could foreclose future options by wastewater reuse. Funds for a wastewater reclamation project may not be made available once an acceptable method of disposal is in operation.

Alternatives 170 and 171 would permanently remove large acreages of grazing land from production to store wastewater for irrigation reuse. The long-term land dedication would be made in exchange for providing the maximum possible benefit to the area's water-short condition.

Alternative 134 would discharge wastewater to the lower Salinas River or lagoon rather than to the ocean during non-irrigation months. This would eliminate the need for the resource commitments of an ocean outfall, but could contribute to water quality conditions that narrow the range of future recreational uses of the lower Salinas River and/or lagoon. In reality, wastewater discharges are only one of several factors adversely affecting the recreational potential of the lower Salinas River.

The long-term dedication of land areas, construction materials, numerous natural resources and considerable capital required for each of the five regional alternatives is justified at this time because current wastewater treatment systems in north Monterey County do not meet the requirements of existing and future NPDES discharge permits required by the Federal Water Pollution Control Act Amendments of 1972 and issued by the Central Coastal Regional Water Quality Control Board. Delay in implementation of a project ("no action") would result in failure to comply with the deadlines established in the FWPCA, and would continue the degradation of water quality in the Salinas River, Tembladero Slough and southern Monterey Bay created by present wastewater discharges. The adverse public health implications of the discharges would also continue.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Minor and major irreversible and irretrievable commitments of both renewable and non-renewable resources will occur if any of the proposed projects are implemented. Construction will irretrievably commit mineral resources in the form of aggregate; pipe, treatment plant structures; excavated, displaced and submerged soils and vegetation; and petroleum fuel sources. A considerable amount of man-hours and energy resources will also be required. The pipe lengths and land commitments of each alternative were presented in the Alternative Projects section. Capital commitments for construction are also listed in this section.

After a project is in operation, man-hours and chemical and energy resources will continue to be utilized. The more advanced treatment systems (Alternatives 134, 166 and 170) generally require the largest inputs of these resources. Annual chemical and energy requirements are listed in Tables 33 and 34. The land uses and land areas displaced by treatment and disposal facilities will be lost for at least the lifetime of the facilities.

The new wastewater system is designed to accommodate the growth anticipated by local government agencies. If the other necessary elements of public service infrastructure are made available (i.e. water supply, roads, electrical power, etc.), growth will probably proceed within the project service area as described in the Secondary Impacts section of this report. Open space and agricultural land on the fringes of Castroville and Salinas would be irreversibly converted to suburban subdivisions. The loss of Salinas Valley's prime agricultral land on the fringes of these two communities is of special concern. Additional open space and valuable natural land could be lost to "new town" type subdivisions north of Salinas, near Moss Landing, in the Castroville-Prunedale area or in the Monterey-Salinas corridor area. Open grassland and oak-woodland plant communities with value as grazing land, wildlife habitat, and scenic relief would be irreversibly committed to residential use if these areas are developed.

SIGNIFICANT ISSUES TO BE RESOLVED

In the process of conducting this study, several key issues have been identified that cannot be resolved with existing data or within the existing project time constraints. These issues are summarized below, and recommendations are made for their resolution.

The issue that has created the most local concern is the feasibility of reusing treated wastewater for irrigation of vegetable crops in the lower Salinas Valley. Wastewater effluents are being furrow and spray irrigated on crops at many different localities throughout California and the nation, but few if any are spray irrigating crops such as lettuce and artichokes that are sold unprocessed to the public. Local health and agricultural agencies have expressed concern over the potential public health, soil and crop damage and crop marketability problems that could develop from irrigating with wastewater. Because the magnitude of these impacts could vary with soil and crop conditions, local agricultural practices and wastewater quality, there is a reluctance to rely on the experience of similar operations existing in other parts of the country. For this reason, the MPWPCA has proposed conducting a pilot agricultural demonstration project to study the site specific effects of wastewater irrigation in the Salinas Valley.

Engineering Science, Inc. has developed a preliminary agricultural demonstration study program for federal, state and local agency consideration. A panel of technical advisors was solicited from the public and private sectors to review this proposal and suggest changes to maximize its effectiveness. This technical advisory committee will monitor the progress of the demonstration project if it is implemented. It is recommended that this study be conducted to demonstrate the feasibility of the planned irrigation project and to answer the unresolved questions of impact on public health and local soils, crops and agriculture.

There have also been numerous questions raised regarding the potential impacts a regional ocean outfall would have on Monterey Bay. There is a wealth of information available about the general physical oceanographic conditions and biological resources in the bay, and detailed studies have been conducted at specific locations within the bay. It is felt, however, that detailed oceanographic and biological data specific to the proposed outfall site are necessary to fully assess the impact of the discharge. These data are also needed to establish a baseline which could be used to note changes in local conditions should an outfall be established.

General statements have been made in this EIS regarding the potential impacts of the proposed outfall, but the detailed current pattern, density and biological data being collected by Engineering Science, Inc. are needed to more accurately predict what the impacts might be. The data now being collected should be incorporated into a final analysis of the ocean outfall prior to implementing this disposal option. The detailed pre-discharge data will also be used to compare with actual discharge monitoring data required by EPA and the SWRCB once the outfall is in use.

An additional major unresolved issue relates to water quality in the Salinas River lagoon. All of the proposed wastewater system alternatives suggest elimination of the two Salinas wastewater discharges to the lower Salinas River. These two discharges affect water quality conditions downstream in the lagoon, especially during dry season low flow conditions. In order to properly assess the impact this discharge elimination would have on the lagoon, more complete flow and water quality data are needed.

Presently, detailed Salinas River flow and water quality data are collected at the U.S.G.S. Spreckels gauging station which is located downstream from the Salinas-Alisal waste discharge but upstream from the Salinas Main discharge. There are no consistently used flow or quality monitoring stations on the river below Salinas. Blanco Drain, a major agricultural runoff drainage ditch, enters the river approximately halfway between the Salinas Main discharge and the ocean. The water quality and flow in this ditch is now being monitored on a regular basis by the Monterey County Flood Control and Water Conservation District, but little data are presently available. The river and the drainage ditch are the key influences on water quality in the lagoon, but the relationship of their individual influences is not known. In order to understand what the effect of removing the Salinas River summer flows will have on the lagoon, its present influence must be better understood.

Several important pieces of information are needed to resolve this issue. First, an accurate picture of the lagoon's current water quality and nutrient budget is needed. At least one year of data collection would be necessary to get a complete picture. Quality parameters including dissolved oxygen, chemical oxygen demand, biochemical oxygen demand, pH, salinity and temperature stratification should be measured at regular intervals; simultaneous flow measurements would be needed.

Total nutrient concentrations in both the water and bottom sediments should be determined and diurnal changes in algae recorded. In order to determine the relative inputs from outside sources, similar water quality measures should be made in the shallow groundwater adjacent to the lagoon, in the Blanco Drain, and in the Salinas River just upstream from the lagoon. With this information in hand, the impact of eliminating the Salinas discharges could be better understood. This same information would aid the analysis of a lower river waste discharge proposed in Alternative 134. In order to comply with SWRCB (1974) policy stated in their Water Quality Control Policy for the Enclosed Bays and Estuaries of California, it must be demonstrated that the Alternative 134 lower river discharge "would consistently be treated and discharged in such a manner that it would enhance the quality of receiving waters above that which would occur in the absence of the discharge." It is most difficult to determine whether or not the discharge would enhance Salinas River lagoon water quality when the dynamics of the lagoon's existing quality are not known.

Non-point source water pollution control planning (required under Section 208 of the Federal Water Pollution Control Act Amendments of 1972) has been recently initiated in the Monterey Bay region. AMBAG, the designated 208 Planning agency, has developed a work plan that includes a compilation of existing water quality conditions throughout the area. Where available data is insufficient to identify sources of pollution, more data will be collected. It is possible that the 208 study could answer the water quality questions on the lower Salinas River, but the time frame for that study does not appear to allow its consideration in the MPWPCA wastewater facilities planning.

The air quality implications of continued urban development which will be accommodated by the proposed project have raised several policy and technical issues which must be resolved before final action is taken on the proposed project. These issues revolve around questions of AQMA designations for Monterey County and procedures for mitigating the indirect impacts of the proposed project.

Monterey County could be designated by EPA as an air quality maintenance area following a recommendation for such action by ARB. The air quality analysis presented in this report supports such a designation with regard to oxidants. The situation with regard to NO_2 is much less clear. The air quality maintenance planning program in California was intended to focus on existing or anticipated air quality problems during the 1975-1985 time frame. The projections presented in this report indicate maintenance of the state 1-hour NO_2 standard throughout this period, but possible violation of the standard during the 1985-1995 period. The dominant role of the Moss Landing power plant in regard to NO_x emissions makes any attempt to accurately forecast future NO_2 levels difficult. The programs which would be initiated following any AQMA designation for Monterey County were discussed previously (see the air quality discussions in the Environmental Setting and Secondary Impacts sections).

Several interrelated technical and policy issues must be resolved before a program of mitigation measures acceptable to all involved local, state and federal agencies can be adopted. As indicated by the two development scenarios analyzed in the Secondary Impacts section of this report, the sizing of the proposed project will be a major factor in determining the extent of mitigation required. The technical issue regarding selection of an appropriate VMT forecast also has a bearing on this issue.

Current policies of the California Air Resources Board allow use of any of the following procedures for calculating the extent of mitigation which must be demonstrated through a mitigation program:

- "Fair Share Method" - Development of measures which will produce a percentage reduction in projected emissions in the project service area equivalent to that which is required to meet air quality standards in the "project impact area" (i.e., the area for which the air quality forecast was prepared).

- "Ton for Ton Method" - Development of specific measures for the project service area which will offset the future stationary and mobile source emissions associated with the amount of growth induced or accommodated by the proposed project.

- Development of measures which will result in sufficient emissions reductions to indicate achievement and maintenance of the applicable ambient air quality standards.

While the evaluations performed to date have focused on the health-related federal and state ambient air quality standards, the implications of the proposed state air conservation program should also be considered. This program may result in development of air quality standards designed to protect agricultural productivity. For some pollutants, such standards may be more stringent than the current health-based standards. The possibility exists that Monterey County would be designated as an area where such crop protection standards would take precedence over the health-based standards.

A final set of unresolved air quality-related issues involves the practical matter of implementing whatever mitigation measures may be required. The Monterey Peninsula Water Pollution Control Agency has only limited authority to take direct action other than redesign of the proposed project. Any specific stationary source, land use, or transportation control measures would have to be implemented by other agencies. The activation of an air quality maintenance planning program in Monterey County would provide a formal mechanism for dealing with this issue. The Association of Monterey Bay Area Governments provides one other mechanism for addressing this issue, although means to assure implementation of the required measures are not readily apparent.

The California State Water Resources Control Board has in the past relied upon ongoing air quality maintenance planning programs to resolve the practical issues of which agencies will implement which measures. Existing SWRCB guidelines have required that affected local governmental agencies adopt resolutions of support for the ongoing AQMP program. However, no such program currently exists in Monterey County. Recent amendments to these SWRCB guidelines indicate that temporary flow limitations may in some cases be imposed on the project applicant. The legal and institutional procedures for imposing such flow restrictions on MPWPCA have yet to be fully investigated.

Several lesser issues that deserve mention relate to subsurface geologic conditions in the dunelands south of the Salinas River. Land in the vicinity of Alternative Treatment Plant Site 4 (see Figure 28) has been suggested as a possible infiltration-percolation and underground storage area. The potential impact this operation might have on groundwater supplies in the area cannot be accurately determined without a detailed geohydrologic investigation of the proposed site. In addition, it has been recommended that a subsurface geologic investigation of the Marina landfill site is needed to determine the continuity of the clay layer underlying the site. This information is needed to analyze the potential effect of sludge disposal on groundwater. If either subsurface storage of wastewater or landfilling of sludge are to be implemented in the future, qualified geohydrologists should be retained to conduct the necessary subsurface geologic investigation.

Mitigation of the fish, wildlife and vegetation impacts associated with removing the existing Salinas River discharges also includes several unresolved issues. In order to initiate a program of additional San Antonio and/or Nacimiento Reservoir releases for mitigation below Salinas, the availability of reservoir water for a release program must be determined. This will require both legal and political decisions. The volume and timing of releases needed to maintain downstream habitat would also have to be calculated. For groundwater pumping and regional plant pump-back mitigations, it would be necessary to meet with the California Department of Fish and Game to establish the most beneficial discharge point and the minimum acceptable volume of flow to maintain fisheries. If groundwater pumping were used as a mitigation flow source, it would be necessary to fully investigate the availability and quality of surface aquifer supplies near the pumping site. Potential effects on adjacent agricultural or domestic wells should also be identified. The quality and general availability of water in the supposed "900-foot aquifer" is already being investigated by Monterey County.

Finally, if treated wastewater is to be supplied to the wildlife management area near the mouth of the Salinas River for habitat enhancement, the county and state health departments must be contacted to determine the level of treatment needed to allow this reuse. The real issue at hand is whether waterfowl hunting and bird watching should be considered contact or non-contact water recreation. The California Department of Health has expressed the desire to review the specific details of the proposed use prior to making a judgement (Crook, pers. comm.).

GLOSSARY*

ACRE-FOOT	A volume of water 1 foot deep and 1 acre in area or 43,560 cubic feet (325,851 gallons).
AERATION	Bring about contact between air and a liquid by spraying the liquid in the air, bubbling air through the liquid or agitating the liquid to promote surface absorption of air.
ALCALDE	The chief administrative and judicial officer of a Spanish town.
ALGAE	Primitive plants, one or many celled, usually aquatic, and capable of converting foodstuffs to complex organic compounds by photosynthesis.
ALGAL BLOOM	Sudden increase in amount of algae which may affect the chemical and physical properties of the water.
ALLUVIAL FAN	A low, fan-shaped cone of silt, sand and gravel material transported and deposited by flowing water.
ANADROMOUS FISH	Fish which inhabit ocean or saline waters for most of their life cycle but which ascend the river of their birth to spawn.
AQUIFER	A porous, water-bearing geologic formation. Generally restricted to materials capable of yielding an appreciable supply of water.
AQUICLUDE	A geologic formation of low permeability that prevents the flow of groundwater.
AVAILABLE OXYGEN	Quantity of dissolved oxygen available for oxidation of organic matter in a water body.
AVAILABLE WATER CAPACITY	The amount of water, expressed in inches, that the soil can retain and hold available for absorption by plant roots.
BENEFICIAL USES	Existing and potential uses which are considered desirable for human activity and for protection of the natural environment. The RWQCB employs beneficial uses to determine discharge requirements to a body of water.

BENTHOS, BENTHIC	The aggregate of organisms living on or at the bottom of a body of water (benthic - occurring on or at the bottom of a body of water).
BERM	A low mound or dike of earth or other material.
BIOCHEMICAL OXIDATION	Oxidation brought about by biological activity; results in chemical combination of oxygen with organic matter.
BIOCHEMICAL OXYGEN DEMAND (BOD)	A measure of the organic matter present in a water which can be metabolized by bacteria in a given period of time, usually five days.
BRACKISH	Containing total dissolved salts upward to 1,000 ppm; slightly saline.
CARBONACEOUS OXIDATION	The process whereby living organisms in the presence of oxygen convert the organic matter contained in wastewater into a more stable or a mineral form.
CFS	Cubic feet per second, a unit of measure of the rate of liquid flow past a given point.
CHEMICAL COAGULATION	A process involving addition of chemicals to precipitate out or flocculate undesirable suspended matter in wastewater.
CHLORIDE (Cl)	A major negative ion found in water and wastewater.
CHLORINATION	The application of chlorine to water or wastewater, generally for the purpose of disinfection.
COLIFORM BACTERIA	A type of bacteria. Its ease of identification makes it readily usable as an indicator of the presence of associated, potentially harmful bacteria (measured in MPN/100 ml [most probable number per 100 milliliters], a statistical averaging method).
COLIFORM BACTERIA (FECAL)	Coliform bacteria found in the intestines of warm-blooded animals; used as an indicator of the presence of human wastes in water.
CONDUCTANCE (ELECTRICAL OR SPECIFIC)	The ability of water to conduct electricity, measured in micromhos; conductance is related directly to the amount of dissolved salts in the water.
CONNATE WATER	Salt water, presumably sea water, entrapped in deeply buried marine sedimentary rocks.

COST EFFECTIVE	A term used when comparing the relative economic, environmental and social costs of alternative plans or projects. For wastewater projects, EPA strives to promote the alternative that meets the project objective with the lowest combined economic, environmental and social cost (i.e., the most cost effective alternative).
DEMERSAL	Living or feeding on or immediately above the bottom of the sea.
DISINFECTION	The selective destruction of disease-causing organisms (viruses, bacteria) present in a waste stream.
DISSOLVED OXYGEN (DO)	The oxygen dissolved in water, expressed in milligrams per liter, parts per million or percent of saturation.
DISSOLVED SOLIDS, also TOTAL DISSOLVED SOLIDS (TDS)	Dissolved material found in water; in natural water it is mainly the sulfates, bicarbonates, and chlorides of calcium, magnesium, and sodium. Usually expressed as parts per million or milligrams per liter.
DIURNAL	Having a daily cycle.
DOMESTIC WASTEWATER	See municipal wastewater.
EFFLUENT	Wastewater or other liquid, partially or completely treated, flowing from a point source.
EIS	Environmental impact statement.
ENGINEERING CLASSIFICATION	Soil classification systems used by engineers to categorize soils on the basis of their physical properties.
EPICENTER	The part of the earth's surface directly above the focus of an earthquake.
ESTUARY	A passage in which the tide meets a river current, especially an arm of the sea at the lower end of a river.
EVAPOTRANSPIRATION	Loss of water from the soil both by evaporation and by transpiration (loss of watery vapor through leaves) from the plants growing thereon.

EURYHALINE	Able to live in waters of a wide range of salinity.
FEDERAL SECONDARY TREATMENT EFFLUENT REQUIREMENTS	Minimum effluent quality standards for secondary treatment in terms of biochemical oxygen demand, suspended solids and pH. Standards are established by EPA.
FILTRATION	The process of passing wastewater through some medium (i.e., sand, activated carbon, diatomaceous earth, etc.) to remove suspended material.
FLOODPLAIN	Belt of low flat ground bordering a stream channel that would be inundated by stream water about once a year under natural conditions.
GEOMORPHIC	Relating to the form or configuration of the earth's surface and its genetic development.
GRANITIC	Composed of a very hard, granular, igneous rock.
GROUNDWATER	Water stored or flowing in porous materials below the earth's surface. Wells and springs are fed by groundwater.
HALOPHYTE	Any of a variety of salt-tolerant plants, able to live in salty soils.
HEAVY METALS	Metals that can be precipitated by hydrogen sulfide in acid solution, for example, gold, lead, silver, mercury, bismuth, copper.
HERBICIDE	Any substance or chemical applied to kill undesirable vegetation.
HYDROGRAPH	A chart or graph plotting stream flow data.
HYDROGRAPHY	The description and study of bodies of water.
HYDROPHYTE	A plant growing in water or in soil too waterlogged for most plants to survive.
IMPERMEABLE	Not permitting passage of a liquid through its substance.
INTERCEPTOR	A main trunk pipeline that receives flow that has been collected from numerous sources.
INTERTIDAL	A coastal shore zone between extreme high and low tide marks.

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INTERTIDAL	A coastal shore zone between extreme high and low tide marks.

IRRIGATION RETURN FLOWS	Surface and subsurface water collected in perimeter ditches after being applied to agricultural land.
ISOHYET	Lines drawn on maps connecting points of equal annual average rainfall.
ISOTHERM	Lines drawn on maps connecting points of equal temperature.
LAND CAPABILITY CLASSIFICATION	A classification system grouping soils according to their potentialities and limitations for sustained production of commonly grown crops.
LANDINGS	Fish catches, usually measured in tons per year.
LEACHING	Removal of solids from soils by percolating water; can include irrigation and drainage removal of salts and alkalis.
LONG-TERM IMPACT	Impacts that have an extended time frame of effect. These usually last the length of the project or beyond it, and are often associated with its operation.
MARINE SEDIMENTS	Accumulations of silts, sands, clays and gravels that have settled to the bottom in seawater environments.
METAMORPHIC	Igneous and sedimentary rocks that have been altered by tremendous pressures and high temperatures.
mg/l	Milligrams per liter.
MICROMHOS	Unit of electrical conductance; the omho is equal to the reciprocal of the ohm.
MITIGATION	Measures designed to reduce the intensity or extent of an impact.
MORPHOLOGY	A study of structure and form.
MPN	Most probable number; the number of organisms per unit volume that, in accordance with statistical theory, would be more likely than any other number to yield the observed test results.

MUNICIPAL (DOMESTIC) WASTEWATER	Water-borne wastes principally derived from the use of sanitary conveniences of dwellings, office buildings and industrial plants.
NITRIFICATION	The process by which ammonia present in wastewater is biologically oxidized to become nitrite; the nitrite is then oxidized by a different group of microorganisms to become nitrate. This reduces the toxicity of the effluent.
NITROGEN (N)	An element essential for plant growth; may be considered a pollutant if found in high concentrations in certain compounds.
NON-POINT SOURCES	Wasteloads which do not enter receiving waters at a commonly identifiable location, (e.g. agricultural and storm runoff).
NUTRIENTS	Any substance or ingredient which is essential to growth; in this report it refers primarily to nitrogen and phosphorous compounds.
NUTRIENT REMOVAL	The process by which nitrates and phosphates are removed from wastewater after nitrification occurs. This is normally accomplished by the action of anaerobic bacteria that convert nitrate to nitrogen gas in the presence of a carbon source (e.g., methane). Chemical precipitation after the denitrification step removes the phosphates.
100 YEAR FREQUENCY FLOOD	A flood that has a probability of being exceeded once in 100 years, on the average.
OUTFALL	The point, location, or structure where wastewater or drainage discharges from a conduit or sewer system.
PERCHED WATER	Localized body of groundwater trapped above the surrounding groundwater table by an impervious layer of material.
PERCOLATE, PERCOLATION	To filter or pass through, as water through a sand layer.
PERMEABLE	Capable of permitting liquids or gases to pass through.
PERMEABILITY	The rate at which water may pass through a soil mass or soil horizon.
PESTICIDE	Any substance or chemical applied to kill or control pests, including weeds, insects, algae and rodents.

pH	A measure of hydrogen ion concentration on a scale of 1-14; acidity decreases from pH 1 to 7, alkalinity increases from 7 to 14. Neutral water has a pH of 7, sea water is about 8 pH.
PHREATOPHYTE	A deep-rooted plant that obtains its water from the water table (zone of saturation).
PHOSPHORUS	A naturally-occurring element essential for plant growth, and which with nitrogen may stimulate algal blooms.
PHYSIOGRAPHIC	Relating to the physical geographic or landform character of an area.
PHYTOPLANKTON	Planktonic plant life.
PIEZOMETRIC SURFACE	Hydrostatic pressure level of water in an aquifer; and the level to which water would rise if relieved of overbearing pressure.
PLANKTON	Passively floating, drifting or weakly motile organisms in a body of water; usually microscopic.
ppm	Parts per million. A measurement now being replaced by mg/l. 1 ppm of any substance in water equals: 2.7 lbs. per acre-foot 0.0038 gram per gallon 0.0284 gram per cubic foot
ppt	Parts per trillion. A measurement found herein in tables describing pesticide content of water.
PREDATION	A mode of life in which food is primarily obtained by killing and consuming of animals.
PRIMARY TREATMENT	The first major treatment in a wastewater treatment works, usually sedimentation. The removal of a substantial amount of suspended matter but little or no colloidal and dissolved matter.
PROSTRATE-TYPE PLANT	A type of plant that trails along the ground rather than growing upward.
RECENT	A period in geologic time; relating to the present or post-Pleistocene geologic epoch (also referred to as Holocene).

RECLAIMED WASTEWATER	Wastewater processed for reuse.
RIPARIAN	Relating to or living or located on the bank of a natural watercourse.
SALINE, SALINITY	The relative concentration of salts in water. Sea water contains about 20,000 ppm chloride with a salinity of 35,000 ppm. Water is termed brackish if salinity ranges upward from 1,000 ppm of dissolved salts.
SECONDARY TREATMENT	The treatment of wastewater by biological methods after primary treatment by sedimentation.
SEDIMENTATION	The process of subsidence and deposition of suspended matter carried by wastewater or other liquids by gravity; usually accomplished by reducing the velocity of the liquid below the point at which it can carry suspended material.
SEPTIC	A toxic condition resulting from the spread of bacteria or their products.
SEWAGE	The spent water of a community (this term now being replaced by wastewater).
SHORT-TERM IMPACT	Impacts that have a time frame of effect that is generally less than one year; often related to construction effects.
SHRINK-SWELL POTENTIAL	The relative change in volume of soil material to be expected with changes in moisture content.
SLOUGH	A creek or waterway in a marsh or tide flat.
SLUDGE	The solids separated from wastewater during processing, or deposits on bottoms of streams or other water bodies.
SOIL ASSOCIATIONS	A group of defined taxonomic soil units occurring together in a characteristic pattern over a geographic region.
SPECIFIC CONDUCTANCE	A measure of the resistance of a solution to electrical flow; resistance decreases as content of ionized salts increases.
SUBTIDAL	Coastal zone seaward of the extreme low tide line.
SUSPENDED SOLIDS	Solids that either float on the surface of, or are in suspension in water, wastewater, or other liquids.

SYNERGISTIC	Cooperative action of discrete agents such that the total effect of their actions is greater than the sum of the effects taken independently.
TDS	See Dissolved Solids.
TERTIARY TREATMENT	Wastewater treatment beyond the secondary level; usually involves additional filtration, chemical coagulation and sedimentation.
THERMOCLINE	A layer in a thermally stratified body of water that separates in an upper, warmer, lighter, oxygen-rich zone from a lower, colder, heavier, oxygen-poor zone.
TURBIDITY	The reduction of transparency of a liquid due to the scattering and absorbing of light by suspended particulates.
UNDERSTORY	An underlying layer of low vegetation.
WASTEWATER	Spent or used water from every source; in this report it refers primarily to water that has been used in industrial processes or in the home and then discharged to a collection and treatment system.
WASTEWATER RECLAMATION	Processing of wastewater for reuse.
0/00	Parts per thousand; an indication of concentration.

* Many of the above water-related definitions were taken directly from the _Central Coastal Water Quality Control Plan Report, Part II_ (California State Water Resources Control Board, 1975).

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NORTH MONTEREY COUNTY FACILITIES PLAN
DRAFT EIS/EIR - ADDENDUM
(SCH No. 77042516)

The following pages include changes made by Jones & Stokes Associates, Inc. to the North Monterey County Facilities Plan Draft EIS/EIR (April 1977) subsequent to its printing. These changes were necessitated by errors in population projections discovered in Table 46 of the "Secondary Impacts" section of the report after printing of the document had been initiated. Correction of these numbers required subsequent changes in the text and the enclosed tables and figures. This addendum should be attached to your copy of the *Draft Environmental Impact Statement and Report - North Monterey County Facilities Plan*, which was prepared jointly by the U. S. Environmental Protection Agency, Region IX and the Monterey Peninsula Water Pollution Control Agency.

Comments on this material may be made in person at the two public hearings scheduled for the Draft EIS/EIR (Monterey - May 18, 1977; and Salinas - May 19, 1977) or in writing addressed to the U. S. Environmental Protection Agency, Region IX, Attention: Hearing Office, 100 California Street, San Francisco, California 94111.

May 10, 1977

TEXT CHANGES TO ACCOMPANY REVISED AIR QUALITY TABLES AND FIGURES

Page	Paragraph	Line	Correction
296			Replace with revised Table 46.
297	2	11	...22.3 VMT per capita...
299	3	12	~~Aircraft,~~ Railroad,
		17	Add new sentence to paragraph: Aircraft emissions are based on projected aircraft activity and aircraft type emission factors (Appendix A-7).
300			Replace with revised Table 47.
301	2	15	...exceed 0.014 ppm...
	3	2-6	Revise second sentence of paragraph to read as follows: This clearly indicates that if development actually occurs at or above the rate projected by the Department of Finance D-100 population forecast, the federal health-related air quality standards for photochemical oxidant will not be achieved and maintained during the period through 1995.
	4		Delete entire paragraph.
302			Replace with revised Figure 44.
303			Replace with revised Table 48.
304	2	4	...from about 1987 through at least 1995.
	3	4-8	Revise second and third sentences of this paragraph to read as follows: Compared to 1974 values, oxidant levels are projected to decline by 15 to 30 percent during the 1974-1985 period and to increase by 5 to 10 percent during the 1985-1995 period. Nitrogen dioxide levels are projected to increase by 70 to 85 percent over the 1974-1995 period.
305			Replace with revised Figure 45.
306	5	9	...below 54.32 tons per day.
307	1	1	...at 43.25 tons per day.
		2	are 112.72 tons per day...
		3	...97.56 tons per day...
		3	Insert new sentence as follows: ...levels. These NO_x thresholds represent a 68 percent increase over 1974 emission levels. Figures...
308			Replace with revised Figure 46.
309			Replace with revised Figure 47.
447			Replace with revised Table III.
448			Replace with revised Table IV.
450			Replace with revised Table VI.
451			Replace with revised Table VII.
452			Replace with revised Table VIII.
453a			Insert new Exhibit 2.
453b			Insert new Exhibit 3.

Table 46

COMPARISON OF SERVICE AREA AND COUNTY POPULATION PROJECTIONS

Year	Facilities Plan Projections			SWRCB D-100 Based Grant-Fundable Service Area Projection[4]	California Department of Finance D-100 County Projection[5]	County Composite Projection[6]
	Total Connected Population[1]	Fort Ord[2]	Service Area Population Less Fort Ord[3]			
1973					255,400	255,400
1974					261,600	261,600
1975				166,819	271,600	271,600
1980	204,500	20,000	184,500	185,639	299,000	297,861
1985	(234,050)	20,000	214,050	204,973	329,800	338,877
1990	263,600	20,000	243,600	227,109	362,100	378,591
1995	289,300	20,000	269,300	249,205	396,500	416,595
2000	315,000	25,000	290,000	276,179	428,400	442,221

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[1] Values for 1980, 1990 and 2000 from Table III-6 of Engineering Science, Inc., 1976d; value for 1985 derived by linear interpolation; value for 1995 from Table 44 of this report.

[2] From Table III-6 in Engineering Science, Inc., 1976d.

[3] Connected population minus Fort Ord.

[4] Don Perrin, SWRCB, pers. comm.

[5] California Department of Fiannce, 1974.

[6] Countywide D-100 forecast minus SWRCB grant-fundable service area forecast plus Facilities Plan service area (less Ft. Ord) forecast.

Table 47

INFLUENCE OF ALTERNATIVE VMT ESTIMATES AND BACKGROUND OXIDANT ASSUMPTIONS ON PROJECTED MAX-HOUR OXIDANT POTENTIAL FOR MONTEREY COUNTY

VMT Forecast	Population Basis	Parameter	1974	1980	1985	1990	1995
Adjusted MCTS Data	D-100 Projection	Vehicle RHC	52.0	34.1	23.1	20.9	21.9
		Total RHC	77.5	64.1	56.0	57.1	60.5
		OX @ B = 0	0.112	0.093	0.081	0.083	0.087
		OX @ B = 0.005	0.112	0.093	0.082	0.084	0.089
		OX @ B = 0.01	0.112	0.094	0.084	0.085	0.090
Adjusted MCTS Data	County Composite Projection	Vehicle RHC	52.0	33.6	23.6	21.7	24.4
		Total RHC	77.5	63.6	57.3	59.0	64.7
		OX @ B = 0	0.112	0.092	0.083	0.085	0.094
		OX @ B = 0.005	0.112	0.093	0.084	0.086	0.094
		OX @ B = 0.01	0.112	0.094	0.085	0.088	0.095
ARB-DMV Data	D-100 Projection	Vehicle RHC	36.2	23.5	15.9	14.2	14.8
		Total RHC	61.7	53.5	48.8	50.4	53.4
		OX @ B = 0	0.112	0.097	0.089	0.091	0.097
		OX @ B = 0.005	0.112	0.098	0.090	0.092	0.098
		OX @ B = 0.01	0.112	0.098	0.091	0.093	0.098
Adjusted ARB-DMV Data	County Composite Projection	Vehicle RHC	36.2	23.4	16.3	14.9	16.5
		Total RHC	61.7	53.4	50.0	52.2	56.8
		OX @ B = 0	0.112	0.097	0.091	0.095	0.103
		OX @ B = 0.005	0.112	0.098	0.092	0.096	0.104
		OX @ B - 0.01	0.112	0.098	0.093	0.096	0.104

NOTES AND SOURCES:

Alternative VMT and population projections presented in Table IV of Appendix A-7.

RHC = Reactive Hydrocarbons. Motor vehicle and total RHC emissions given as tons per day, annual average (values taken directly from or calculated using Tables III through VIII of Appendix A-7).

OX = Ambient oxidant level in parts per million (ppm) by volume; 1974 oxidant level from Appendix A-4, corrected by 0.8 factor to account for recent change in calibration procedures for monitoring instruments (see Appendix A-2).

Federal 1-hour primary ambient air quality standard for oxidant = 0.08 ppm.

California 1-hour ambient air quality standard for oxidant - 0.10 ppm.

B = Natural background oxidant level in ppm.

Projected Max-Hour oxidant potential based on unmodified "rollback" technique:

$$AQ_{fy} = B + (AQ_{by} - B) \times \frac{E_{fy}}{E_{by}}$$

Where: AQ = Ambient air quality (ppm)
B = Natural background pollutant level (ppm)
E = Emissions of precursor pollutant; RHC emissions, tons per day
by = Base year; 1974
fy = Forecast year

Table 48

INFLUENCE OF ALTERNATIVE VMT ESTIMATES ON PROJECTED MAX-HOUR NO_2 POTENTIAL FOR MONTEREY COUNTY

VMT Forecast	Population Basis	Parameter	1974	1980	1985	1990	1995
Adjusted MCTS Data	D-100 Projection	Vehicle NO_x	29.5	28.2	27.7	30.5	34.5
		Total NO_x	66.9	85.6	98.0	115.4	114.3
		NO_2 level	0.15	0.191	0.218	0.256	0.253
Adjusted MCTS Data	County Composite Projection	Vehicle NO_x	29.5	27.9	28.2	31.7	38.5
		Total NO_x	66.9	85.2	99.2	118.4	120.5
		NO_2 level	0.15	0.190	0.220	0.262	0.267
ARB-DMV Data	D-100 Projection	Vehicle NO_x	20.5	19.5	19.0	20.8	23.2
		Total NO_x	57.9	76.9	89.3	105.7	103.0
		NO_2 level	0.15	0.198	0.229	0.271	0.264
Adjusted ARB-DMV Data	County Composite Projection	Vehicle NO_x	20.5	19.4	19.5	21.8	25.9
		Total NO_x	57.9	76.7	90.5	108.5	107.9
		NO_2 level	0.15	0.197	0.232	0.278	0.276

NOTES AND SOURCES:

Alternative VMT and population projections presented in Table IV of Appendix A-7.

NO_x = Oxides of Nitrogen. Motor vehicle and total NO_x emissions given as tons per day, annual average (values taken directly from or calculated using Tables III through VIII of Appendix A-7).

NO_2 = Ambient Nitrogen Dioxide level in parts per million (ppm) by volume (see Appendix A-4). California 1-hour ambient air quality standard for NO_2 = 0.25 ppm

Projected Max-Hour NO_2 potential based on unmodified "rollback" technique:

$$AQ_{fy} = B + (AQ_{by} - B) \times \frac{E_{fy}}{E_{by}}$$

Where: AQ = Ambient air quality (ppm)
B = Natural background pollutant level; 0.004 ppm (California Air Resources Board, 1974a)
E = Emissions of precursor pollutant; NO_x emissions, tons per day
by = Base year; 1974
fy = Forecast year

Table III

MODIFIED MONTEREY COUNTY EMISSIONS INVENTORIES FOR HYDROCARBONS AND NITROGEN OXIDES
(TONS PER DAY, ANNUAL AVERAGE)

Source Category	1973[1]			1974[2]		
	THC	RHC	NO_x	THC	RHC	NO_x
Petroleum Marketing	3.3	3.2	0	3.2	3.1	0
Solvent Users:						
Surface coatings	2.6	2.4	0	2.6	2.4	0
Degreasing	1.8	0.3	0	1.8	0.3	0
Dry cleaning	0.9	0	0	0.9	0	0
Other	7.9	5.8	0	3.1	2.3	0
Food Processing	0	0	0.8	0	0	0.8
Pesticides	10.2	10.2	0	3.3	3.3	0
Fuel Combustion:						
Power plants	0.4	0.2	24.5	0.5	0.5	17.4
Other industry	0.5	0.2	9.8	0.1	0.1	9.8
Domestic and commercial	0.3	0.1	1.5	0.1	0.1	1.5
Waste Burning:						
Agriculture and range	1.2	0.7	0.1	1.0	0.5	0.1
Other	6.5	3.4	0	3.8	2.0	0
Total Stationary Sources	35.6	26.5	36.7	20.4	14.6	29.6
Miscellaneous Area Sources	1.5	1.0	0	1.5	1.0	0
Motor Vehicles - On Road	57.9	52.6	29.7	57.3	52.0	29.5
Trains and Off-Road Vehicles	3.7	3.4	7.5	3.6	3.3	7.4
Aircraft	7.7	6.6	0.4	7.7	6.6	0.4
Total Mobile Sources	69.3	62.6	37.6	68.6	61.9	37.3
TOTAL EMISSIONS	106.4	90.1	74.3	90.5	77.5	66.9
Percent of Emissions From:						
Stationary sources	33.5	29.4	49.4	22.5	18.8	44.2
Miscellaneous area sources	1.4	1.1	0	1.7	1.3	0
Mobile sources	65.1	69.5	50.6	75.8	79.9	55.8

NOTES AND SOURCES are on the following page.

NOTES AND SOURCES FOR TABLE III

THC	Total hydrocarbons
RHC	Reactive hydrocarbons (ARB reactivity Classes II and III)
NO_x	Oxides of nitrogen

[1] From California Air Resources Board, 1976c (see Appendix A-3) with the following modifications:

- All petroleum production emissions omitted to exclude the San Ardo oil fields from consideration in "base year" conditions in air quality projections.
- THC emissions associated with pesticide use from Monterey-Santa Cruz Air Pollution Control District, 1974 (Appendix A-3); RHC emissions based on ARB reactivity classification (Appendix A-6).
- NO_x emissions from food processing based on Monterey-Santa Cruz County Air Pollution Control District, 1974.
- NO_x emissions from fuel combustion by "other industry" corrected through comparison with county APCD data to exclude emissions associated with petroleum production.
- NO_x emissions from agricultural and range management burning based on Monterey-Santa Cruz County Air Pollution Control District, 1974.
- Motor vehicle emissions based on adjusted VMT level from the Monterey County Transportation Study (California Department of Transportation, 1976) and VMT-weighted, class-composite vehicle emission factors for Monterey County (see Table IV and Table V, respectively).
- Aircraft emissions based on aircraft activity data (Exhibit 2 of this appendix) and emission factors presented in Appendix A-5, Exhibit F.

[2] From Monterey Bay Unified Air Pollution Control District, 1975 (see Appendix A-3) with the following modifications:

- For source categories showing no change from 1973 value in the THC emissions, RHC emissions held at 1973 level. RHC emissions for "other" solvent users category based on reactivity factor derived from 1973 data; RHC emissions for remaining source categories based on ARB reactivity classification (Appendix A-6).
- All petroleum production emissions omitted to exclude San Ardo oil fields from consideration in "base year" conditions in air quality projections.
- Miscellaneous area source emissions assumed equal to 1973 emissions reported in California Air Resources Board, 1976c.
- Motor vehicle emissions based on adjusted VMT level extrapolated from Monterey County Transportation Study and VMT-weighted, class-composite vehicle emission factors for Monterey County (see Table IV and Table V, respectively).
- Aircraft emissions based on aircraft activity data (Exhibit 2 of this appendix) and emission factors presented in Appendix A-5, Exhibit F.

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- NO_x emissions from agricultural and range management burning based on Monterey-Santa Cruz County Air Pollution Control District, 1974.
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[2] From Monterey Bay Unified Air Pollution Control District, 1975 (see Appendix A-3) with the following modifications:

- For source categories showing no change from 1973 value in the THC emissions, RHC emissions held at 1973 level. RHC emissions for "other" solvent users category based on reactivity factor derived from 1973 data; RHC emissions for remaining source categories based on ARB reactivity classification (Appendix A-6).
- All petroleum production emissions omitted to exclude San Ardo oil fields from consideration in "base year" conditions in air quality projections.
- Miscellaneous area source emissions assumed equal to 1973 emissions reported in California Air Resources Board, 1976c.
- Motor vehicle emissions based on adjusted VMT level extrapolated from Monterey County Transportation Study and VMT-weighted, class-composite vehicle emission factors for Monterey County (see Table IV and Table V, respectively).
- Aircraft emissions based on aircraft activity data (Exhibit 2 of this appendix) and emission factors presented in Appendix A-5, Exhibit F.

Table IV

COMPARISON OF POPULATION/VMT FORECASTS

Parameter	Forecast Basis	1973	1974	1980	1985	1990	1995	% Change 1973-1995
Population	MCTS[1]	251,653					392,040	55.8%
Daily VMT	MCTS[1]	4,900,000					8,736,000	78.3%
Population	D-100[2]	255,400	261,600	299,000	329,800	362,100	396,500	55.2%
Daily VMT	ARB-DMV[3]	3,460,685	3,573,781	4,251,945	4,817,123	5,382,329	5,947,534	71.9%
Population	D-100[2]	255,400	261,600	299,000	329,800	362,100	396,500	55.2%
Daily VMT	Adjusted MCTS[4]	4,972,959	5,142,676	6,166,451	7,009,560	7,893,730	8,835,384	77.7%
Population	County Composite[2]	255,400	261,600	297,861	338,877	378,591	442,221	73.1%
Daily VMT	Adjusted ARB-DMV[5]	3,460,685	3,573,781	4,235,748	4,949,703	5,627,455	6,633,353	91.7%
Population	County Composite[2]	255,400	261,600	297,861	338,877	378,591	442,221	73.1%
Daily VMT	Adjusted MCTS[6]	4,972,959	5,142,676	6,088,550	7,158,460	8,194,406	9,854,205	98.2%

NOTES:

[1] From Monterey County Transportation Study (California Department of Transportation, 1976).

[2] See Table 46 in text of EIS.

[3] Based on California Air Resources Board adjustments of Department of Motor Vehicles' vehicle registration data and projections; derived from data presented in California Air Resources Board, 1976b.

[4] 1973 and 1995 VMT extrapolated on population basis from MCTS data; 1974-1990 VMT calculated as follows (Pop = population):

19— VMT = (19— Pop - 1973 Pop) ÷ (1995 Pop - 1973 Pop) X (1995 VMT - 1973 VMT) + 1973 VMT.

[5] 1973 and 1974 values from unadjusted ARB-DMV data (see note 3). 1980-1995 VMT extrapolated on a population basis from D-100 based ARB-DMV data.

[6] 1973 and 1974 values from D-100 based adjustment of MCTS data (see note 4). 1995 VMT extrapolated on a population basis from unadjusted MCTS data. 1980-1990 VMT calculated as follows:

19— VMT = (19— Pop - 1973 Pop) ÷ (1995 Pop - 1974 Pop) X (1995 VMT - 1974 VMT) + 1974 VMT.

Table VI

COMPARISON OF EMISSION SOURCE GROWTH FACTORS

Source Category	Growth Factors Compatible With									
	D-100 Population Projection					"County Composite" Population Projection				
	1974	1980	1985	1990	1995	1974	1980	1985	1990	1995
Petroleum marketing[1]	1.00	1.14	1.26	1.38	1.52	1.00	1.14	1.29	1.44	1.60
Surface coatings[2]	1.00	1.42	1.77	2.33	2.88	1.00	1.41	1.82	2.44	3.03
Degreasing[2]	1.00	1.42	1.77	2.33	2.88	1.00	1.41	1.82	2.44	3.03
Dry cleaning[1]	1.00	1.14	1.26	1.38	1.52	1.00	1.14	1.29	1.44	1.60
Other solvent users[1]	1.00	1.14	1.26	1.38	1.52	1.00	1.14	1.29	1.44	1.60
Food processing[2]	1.00	1.26	1.48	1.78	2.07	1.00	1.26	1.52	1.86	2.17
Pesticide use[2]	1.00	1.04	1.08	1.13	1.18	1.00	1.04	1.11	1.18	1.24
Other industry fuel use[2]	1.00	1.42	1.77	2.33	2.88	1.00	1.41	1.82	2.44	3.03
Domestic and commercial fuel use[1]	1.00	1.14	1.26	1.38	1.52	1.00	1.14	1.29	1.44	1.60
Agricultural and range burning[2]	1.00	1.04	1.08	1.13	1.18	1.00	1.04	1.11	1.18	1.24
Other waste burning[1]	1.00	1.14	1.26	1.38	1.52	1.00	1.14	1.29	1.44	1.60
Miscellaneous area sources[1]	1.00	1.14	1.26	1.38	1.52	1.00	1.14	1.29	1.44	1.60
Trains and off-road vehicles[1]	1.00	1.14	1.26	1.38	1.52	1.00	1.14	1.29	1.44	1.60

NOTES AND SOURCES:

All growth factors normalized to 1974 as a base year.

[1] Growth factors directly proportional to population projections.

[2] Growth factors based on an index of economic activity, modified from D-100 based factors presented in California Air Resources Board, 1974b (see Exhibit A in Appendix A-5). 1985 and 1995 growth factors shown in Exhibit A of Appendix A-5 were normalized to 1974 as a base year assuming linear change in growth factors for the 1972-1975 period. Growth factors for 1980 and 1990 derived by linear interpolation. For the "County Composite" population projection basis, the 1974-normalized, D-100 based growth factors were multiplied by the ratio of the "County Composite" projection to the D-100 projection.

Table VII

PROJECTED HYDROCARBON AND NITROGEN OXIDE EMISSIONS, D-100 POPULATION PROJECTION BASIS

	Projected Emissions (Tons Per Day, Annual Average)											
	1980			1985			1990			1995		
Source Category	THC	RHC	NO$_x$	THC	RHC	NO$_x$	THC	RHC	NO$_x$	THC	RHC	NO$_x$
Petroleum marketing	3.6	3.5	00	4.0	3.9	00	4.4	4.3	00	4.9	4.7	00
Solvent Users:												
Surface coatings	3.7	3.4	00	4.6	4.2	00	6.1	5.6	00	7.5	6.9	00
Degreasing	3.6	0.4	00	3.2	0.5	00	4.2	0.7	00	5.2	0.9	00
Dry cleaning	1.0	0	00	1.1	0	00	1.2	0	0	1.4	0	0
Other	3.5	2.6	0	3.9	2.9	0	4.3	3.2	0	4.7	3.5	0
Food Processing	0	0	1.0	0	0	1.2	0	0	1.4	0	0	1.7
Pesticides	3.4	3.4	0	3.6	3.6	0	3.7	3.7	0	3.9	3.9	0
Fuel Combustion:												
Power Plants	1.4	1.4	31.8	1.8	1.8	40.0	2.2	2.1	47.8	1.6	1.6	35.8
Other industry	0.1	0.1	13.9	0.2	0.2	17.3	0.2	0.2	22.8	0.3	0.3	28.2
Domestic and commercial	0.1	0.1	1.7	0.1	0.1	1.9	0.1	0.1	2.1	0.2	0.2	2.3
Waste Burning:												
Agriculture and range	1.0	0.5	0.1	1.1	0.5	0.1	1.1	0.6	0.1	1.2	0.6	0.1
Other	4.3	2.3	0	4.8	2.5	0	5.2	2.8	0	5.8	3.0	0
Total Stationary Sources	24.7	17.7	48.5	28.4	20.2	60.5	32.7	23.3	74.2	36.8	25.6	68.1
Miscellaneous Area Sources	1.7	1.1	0	1.9	1.3	0	2.1	1.4	0	2.3	1.5	0
Motor Vehicles-On-Road	37.0	34.1	28.2	25.0	23.1	27.7	22.6	20.9	30.5	23.7	21.9	34.5
Trains and Off-Road Vehicles	4.1	3.8	8.4	4.5	4.2	9.3	5.0	4.6	10.2	5.5	5.0	11.2
Aircraft	8.7	7.4	0.5	8.5	7.2	0.5	8.1	6.9	0.5	7.6	6.5	0.5
Total Mobile Sources	49.8	45.3	37.1	38.0	34.5	37.5	35.7	32.4	41.2	36.8	33.4	46.2
TOTAL EMISSIONS	76.2	64.1	85.6	68.3	56.0	98.0	70.5	57.1	115.4	75.9	60.5	114.3
Percent of Emissions From:												
Stationary Sources	32.4	27.6	56.7	41.6	36.1	61.7	46.4	40.8	64.3	48.5	42.3	59.6
Miscellaneous Area Sources	2.2	1.7	0	2.8	2.3	0	3.0	2.5	0	3.0	2.5	0
Mobile Sources	65.4	70.7	43.3	55.6	61.6	38.3	50.6	56.7	35.7	48.5	55.2	40.4

NOTES AND SOURCES:

THC Total hydrocarbons.
RHC Reactive hydrocarbons (ARB reactivity Classes II and III.
NO$_x$ Oxides of nitrogen.

Except for power plants, motor vehicles and aircraft, emissions projections are based on 1974 average daily emissions (Table III) times the appropriate growth factor listed in Table VI.

Power plant THC and NO$_x$ emissions based on the following annual power generation assumptions (see Exhibit C, Appendix A-5):

1980	8 million megawatt-hours (44% capacity factor).
1985	10 million megawatt-hours (55% capacity factor).
1990	12 million megawatt-hours (66% capacity factor).
1995	9 million megawatt-hours (70% capacity factor following retirement of 582 megawatts of capacity in 1992 as projected in California Energy Resources Conservation and Development Commission, 1976).

Fuel oil assumed to be the exclusive fuel (Exhibit C, Appendix A-5). THC and NO$_x$ emission factors from California Air Resources Board, 1976b (Exhibit 1). Hydrocarbon reactivity factor from Appendix A-6.

Motor vehicle emissions based on adjusted MCTS VMT projections (Table IV) and VMT-weighted, class composite vehicle emission factors for Monterey County (Table V).

Aircraft emissions based on estimates of daily aircraft landings and takeoffs (Exhibit 2 of this appendix) and aircraft type emission factors (Exhibit 3 of this appendix).

Table VIII

PROJECTED HYDROCARBON AND NITROGEN OXIDE EMISSIONS, COUNTY COMPOSITE POPULATION PROJECTION BASIS

	Projected Emissions (Tons Per Day, Annual Average)											
	1980			1985			1990			1995		
Source Category	THC	RHC	NO_x	THC	RHC	NO_x	THC	RHC	NO_x	THC	RHC	NO_x
Petroleum Marketing	3.6	3.5	0	4.1	4.0	0	4.6	4.5	0	5.1	5.0	0
Solvent Users:												
Surface coatings	3.7	3.4	0	4.7	4.4	0	6.3	5.9	0	7.9	7.3	0
Degreasing	2.5	0.4	0	3.3	0.5	0	4.4	0.7	0	5.5	0.9	0
Dry cleaning	1.0	0	0	1.2	0	0	1.3	0	0	1.4	0	0
Other	3.5	2.6	0	4.0	3.0	0	4.5	3.3	0	5.0	3.7	0
Food Processing	0	0	1.0	0	0	1.2	0	0	1.5	0	0	1.7
Pesticides	3.4	3.4	0	3.7	3.7	0	3.9	3.9	0	4.1	4.1	0
Fuel Combustion:												
Power plants	1.4	1.4	31.8	1.8	1.8	40.0	2.2	2.1	47.8	1.6	1.6	35.8
Other industry	0.1	0.1	13.8	0.2	0.2	17.8	0.2	0.2	23.9	0.3	0.3	29.7
Domestic and commercial	0.1	0.1	1.7	0.1	0.1	1.9	0.1	0.1	2.2	0.2	0.2	2.4
Waste Burning:												
Agriculture and range	1.0	0.5	0.1	1.1	0.6	0.1	1.2	0.6	0.1	1.2	0.6	0.1
Other	4.3	2.3	0	4.9	2.6	0	5.5	2.9	0	6.1	3.2	0
Total Stationary Sources	24.6	17.7	48.4	29.1	20.9	61.0	34.2	24.2	75.5	38.4	26.9	69.7
Miscellaneous Area Sources	1.7	1.1	0	1.9	1.3	0	2.2	1.4	0	2.4	1.6	0
Motor Vehicles-On-Road	36.6	33.6	27.9	25.5	23.6	28.2	23.5	21.7	31.7	26.4	24.4	38.5
Trains and Off-Road Vehicles	4.1	3.8	8.4	4.6	4.3	9.5	5.2	4.8	10.7	5.8	5.3	11.8
Aircraft	8.7	7.4	0.5	8.5	7.2	0.5	8.1	6.9	0.5	7.6	6.5	0.5
Total Mobile Sources	49.4	44.8	36.8	38.6	35.1	38.2	36.8	33.4	42.9	39.8	36.2	50.8
TOTAL EMISSIONS	75.7	63.6	85.2	69.6	57.3	99.2	73.2	59.0	118.4	80.6	64.7	120.5
Percent of Emissions From:												
Stationary sources	32.5	27.8	56.8	41.8	36.5	61.5	46.7	41.0	63.8	47.6	41.6	57.8
Miscellaneous area sources	2.2	1.7	0	2.7	2.3	0	3.0	2.4	0	3.0	2.5	0
Mobile sources	65.3	70.4	43.2	55.5	61.3	38.5	50.3	56.6	36.2	49.4	56.0	42.2

NOTES AND SOURCES:

THC Total hydrocarbons.
RHC Reactive hydrocarbons (ARB reactivity Classes II and III.
NO_x Oxides of nitrogen.

Except for power plants, motor vehicles, and aircraft, emissions projections are based on 1974 average daily emissions (Table III) times the appropriate growth factor listed in Table VI.

Power plant THC and NO_x emissions based on the following annual power generation assumptions (see Exhibit C, Appendix A-5):

1980 8 million megawatt-hours (44% capacity factor).
1985 10 million megawatt-hours (55% capacity factor).
1990 12 million megawatt-hours (66% capacity factor).
1995 9 million megawatt-hours (70% capacity factor following retirement of 582 megawatts of capacity in 1992 as projected in California Energy Resources and Development Commission, 1976).

Fuel oil assumed to be the exclusive fuel (Exhibit C, Appendix A-5). THC and NO_x emission factors from California Air Resources Board, 1976b (Exhibit 1). Hydrocarbon reactivity factor from Appendix A-6.

Motor vehicle emissions based on adjusted MCTS VMT projections (Table IV) and VMT-weighted, class-composite vehicle emission factors for Monterey County (Table V).

Aircraft emissions based on estimates of daily aircraft landings and takeoffs (Exhibit 2 of this appendix) and aircraft type emission factors (Exhibit 3 of this appendix).

Exhibit 2

AVERAGE DAILY LTOs AT AIRPORTS IN NORTHERN MONTEREY COUNTY

Aircraft Type	Average Number of Engines	1974	1980	1985	1990	1995
Mid range jet	2.5	19.8	24.7	28.8	32.9	37.0
Air carrier turboprop	3	0.9	0.7	0.5	0.2	---
Business jet	3	3.3	4.4	5.3	6.2	7.1
General aviation turboprop	2	2.4	3.0	3.4	3.9	4.4
General aviation piston	1.2	221.7	258.6	289.4	320.1	350.9
Piston transport	4	90.6	101.2	110.0	118.8	127.6
Helicopter	2	51.1	143.6	143.7	143.8	143.9
Military transport	4	0.4	0.4	0.4	0.4	0.4
Military jet	2	2.8	2.8	2.8	2.8	2.8
Military piston	2	4.0	4.0	4.0	3.9	3.9
Total		397.0	543.4	588.3	633.0	678.0

NOTES AND SOURCES: Data include Monterey Peninsula Airport, Salinas Municipal Airport, Fort Ord and Carmel Valley Airport.

LTO = Landing and takeoff cycle (two "operations" as defined by the Federal Aviation Administration).

1974 aircraft operations at Monterey and Salinas based on MCTS report (California Department of Transportation, 1976); activity by aircraft type based on Appendix A-5, Exhibit G; 1974 activity at Fort Ord based on U. S. Department of the Army, 1976, Draft Environmental Impact Statement, Fort Ord Mission Change. 1974 activity at Carmel Valley based on Appendix A-5, Exhibit G.

1995 activity at Monterey based on Appendix A-5, Exhibit G. 1980-1995 Fort Ord activity from U. S. Department of the Army, 1976. 1995 activity at Salinas assumed to be same as 1974 for military jets and helicopters, proportional to D-100 population increase for piston transport, and twice 1974 levels for general aviation aircraft and business jets. Nominal increases in general aviation activity assumed for Carmel Valley. 1980-1990 aircraft activity interpolated.

EXHIBIT 3

EMISSION FACTORS PER AIRCRAFT LANDING-TAKEOFF CYCLE
(lb/engine)

Aircraft	Solid particulates				Sulfur oxides				Carbon monoxide				Hydrocarbons[b]				Nitrogen oxides (NO_x as NO_2)			
	pre-1981	1985	1990	1995	pre-1981	1985	1990	1995	pre-1981	1985	1990	1995	pre-1981	1985	1990	1995	pre-1981	1985	1990	1995
Jumbo jet	1.30	1.30	1.30	1.30	1.82	1.82	1.82	1.82	46.8	34.0	21.2	8.4	12.2	8.8	5.3	1.8	31.4	26.2	20.9	15.7
Long range jet	1.21	1.01	0.81	0.61[a]	1.56	1.56	1.56	1.56	47.4	34.4	21.4	8.5	41.2	29.6	17.9	6.2	7.9	6.6	5.3	4.0
Medium range jet	0.41	0.34	0.28	0.21[a]	1.01	1.01	1.01	1.01	17.0	12.4	7.8	3.1	4.9	3.52	2.13	0.74	10.2	8.5	6.8	5.1
Air carrier turboprop	1.1	1.1	1.1	1.1	0.40	0.40	0.40	0.40	6.6	5.3	4.0	2.6	2.9	2.12	1.35	0.58	2.5	2.3	2.2	2.0
Business jet	0.11	0.11	0.11	0.11	0.37	0.37	0.37	0.37	15.8	12.6	9.4	6.3	3.6	2.64	1.68	0.72	1.6	1.5	1.4	1.3
General aviation turboprop	0.20	0.20	0.20	0.20	0.18	0.18	0.18	0.18	3.1	2.5	1.9	1.2	1.1	.81	0.51	0.22	1.2	1.2	1.1	1.0
General aviation piston	0.02	0.02	0.02	0.02	0.014	0.014	0.014	0.014	12.2	10.2	8.2	6.1	0.40	0.36	0.32	0.28	0.047	0.047	0.047	0.047
Piston transport	0.56	0.56	0.56	0.56	0.28	0.28	0.28	0.28	304.0	253.4	202.8	152.0	40.7	36.6	32.6	28.5	0.40	0.40	0.40	0.40
Helicopter	0.25	0.25	0.25	0.25	0.18	0.18	0.18	0.18	5.7	5.7	5.7	5.7	0.52	0.52	0.52	0.52	0.57	0.57	0.57	0.57
Military transport	1.1	1.1	1.1	1.1	0.41	0.41	0.41	0.41	5.7	5.7	5.7	5.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2
Military jet	0.31	0.31	0.31	0.31	0.76	0.76	0.76	0.76	15.1	15.1	15.1	15.1	9.93	9.93	9.93	9.93	3.29	3.29	3.29	3.29
Military piston	0.28	0.28	0.28	0.28	0.14	0.14	0.14	0.14	152.0	152.0	152.0	152.0	20.4	20.4	20.4	20.4	0.20	0.20	0.20	0.20

Source: California Air Resources Board, 1976b.

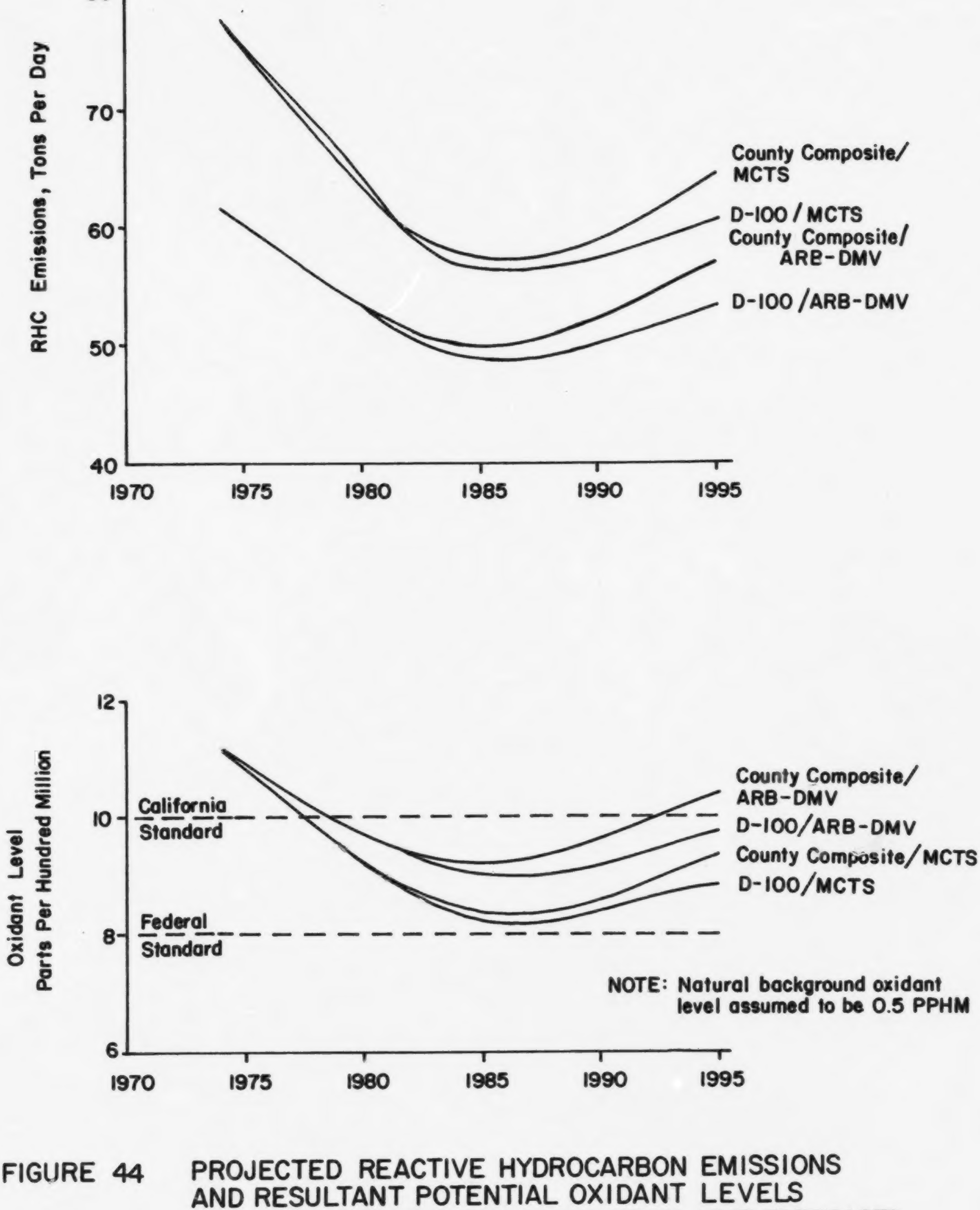


FIGURE 44 PROJECTED REACTIVE HYDROCARBON EMISSIONS AND RESULTANT POTENTIAL OXIDANT LEVELS ASSUMING ALTERNATIVE POPULATION VMT FORECASTS

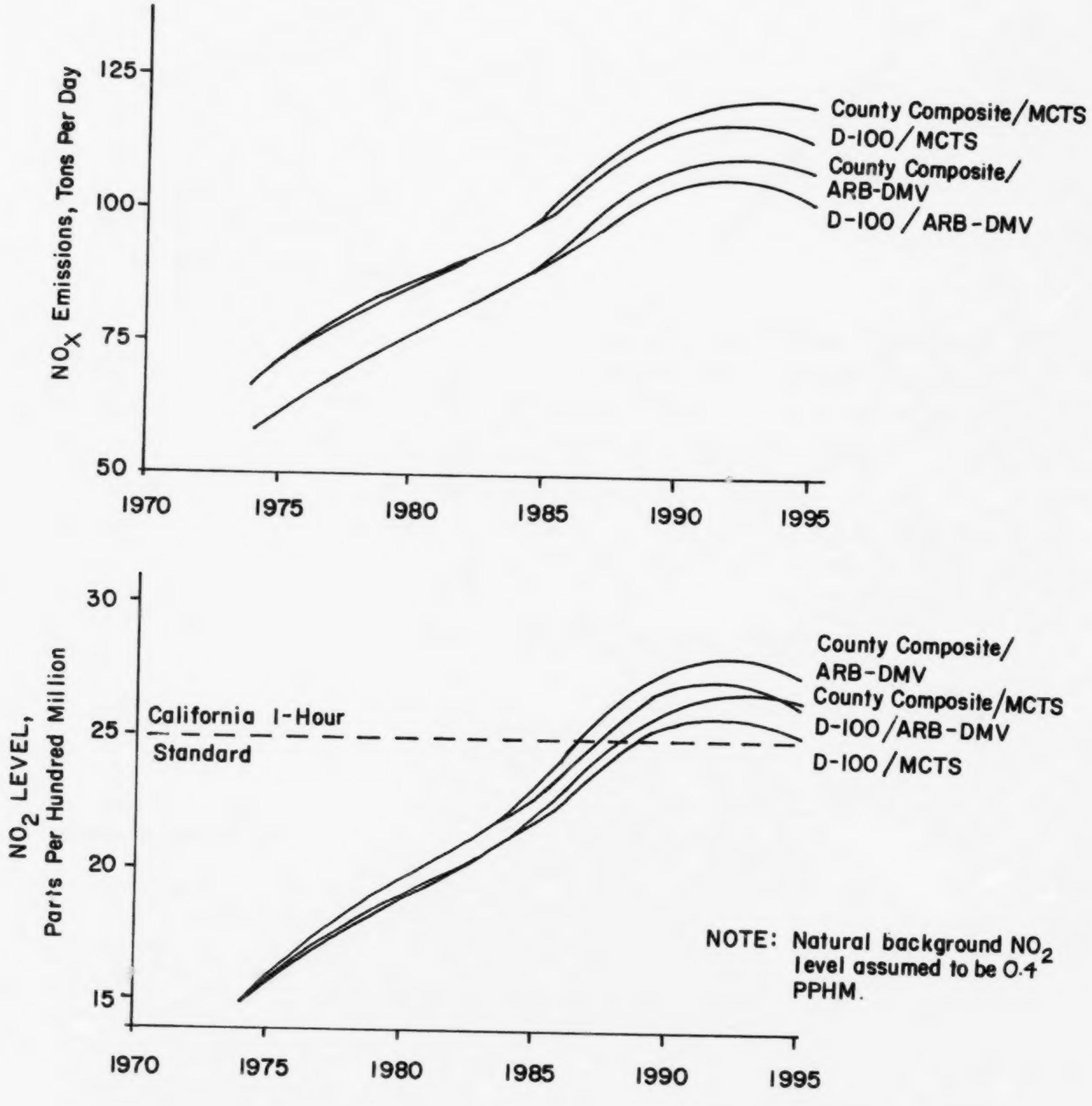


FIGURE 45 PROJECTED NITROGEN OXIDE EMISSIONS AND RESULTANT POTENTIAL NITROGEN DIOXIDE LEVELS ASSUMING ALTERNATIVE POPULATION VMT FORECASTS.

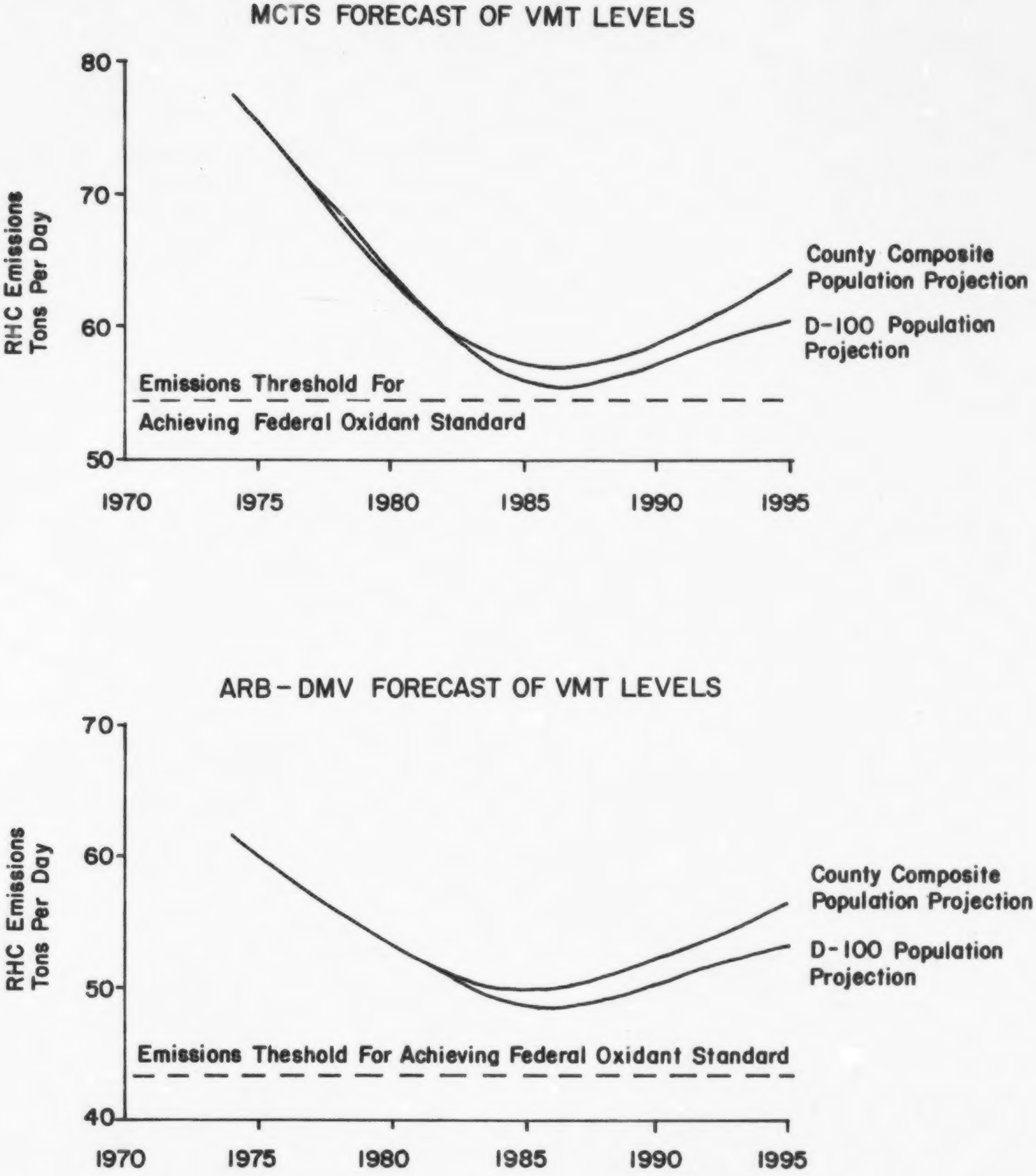
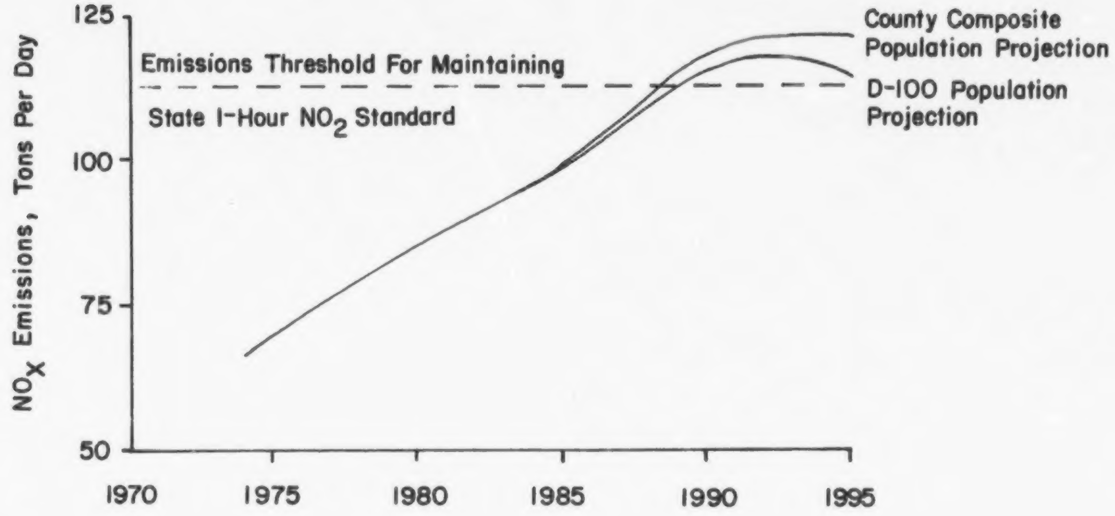
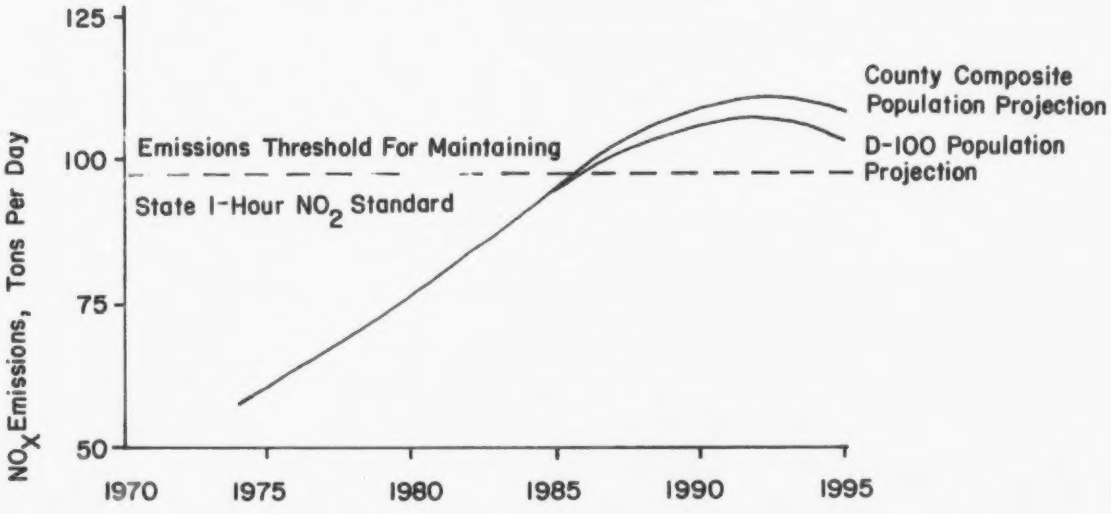


FIGURE 46 REACTIVE HYDROCARBON EMISSIONS PROJECTIONS BASED ON ALTERNATIVE VMT FORECASTS



MCTS FORECAST OF VMT LEVELS



ARB—DMV FORECAST OF VMT LEVELS

FIGURE 47 OXIDES OF NITROGEN EMISSIONS PROJECTIONS BASED ON ALTERNATIVE VMT FORECASTS

TRANSCRIPT OF DRAFT EIS/EIR PUBLIC HEARING

TEXT OF PUBLIC HEARING ON THE DRAFT EIS/EIR

The following pages include the entire transcript of the public hearing held for the North Monterey County Facilities Plan Draft EIS/EIR. The hearing was held on two consecutive nights: Wednesday, May 18, 1977 in Monterey, California; and Thursday, May 19, 1977 in Salinas, California. Substantive questions and comments raised in oral testimony have been responded to in the Response to Comments on the Draft EIS/EIR section which follows. The subject area under which each person's comments are considered is listed in the matrix at the front of the Responses section. Each of the following pages contains two pages of transcript; they follow in sequence from left to right.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

100 California Street

San Francisco, California 94111

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PUBLIC HEARING

on

DRAFT ENVIRONMENTAL IMPACT STATEMENT
AND ENVIRONMENTAL IMPACT REPORT,
NORTH MONTEREY COUNTY FACILITIES PLAN

May 18, 1977

7:30 p. m.
Monterey Public Library
Community Room
625 Pacific Street
Monterey, California

May 19, 1977

7:30 p. m.
Council Chambers
City Hall
200 Lincoln Avenue
Salinas, California

RECEIVED
JUN 2 1977
DIVISION OF WATER QUALITY

Reported by:

THOMAS R. WILSON, CSR, CM
(CSR No. 2052)

HEARING PANEL

MATTHEW S. WALKER, Hearing Officer, Enforcement Division, United States Environmental Protection Agency, Region IX, 100 California Street, San Francisco, California 94111, Chairman

ANTHONY MEI, Environmental Engineer, United States Environmental Protection Agency, 100 California Street, San Francisco, California 94111, Project Officer

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Mr. Charles Kahr, George S. Nolte & Associates, San Jose, California	30
Mr. David Berry, Kennedy Engineers, San Francisco, California, for Carmel Sanitary District	41
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Mr. Ferdinand S. Rutt, 4154 El Bosque Drive, Pebble Beach, California	51
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HEARING EXHIBITS:

1.	Three-page letter to All Interested Agencies, Public Groups and Individuals from Paul De Falco, Jr., November 1, 1974	6
2.	Three-page document, Notice of Public Hearing, April 4, 1977	6
3.	One-page document, Proof of Publication, "Monterey Peninsula Herald," April 15, 1977	7
4.	One-page document, Proof of Publication, "Salinas Californian," April 15, 1977	7
5.	One-page document, Federal Register, Volume 42, No. 83, Page 21838, April 29, 1977	7
6.	Seven-page document, Distribution List, North Monterey County Facilities Plan EIS/EIR	7
7.	596-page bound document entitled "Draft Environmental Impact Statement and Report, North Monterey County Facilities Plan," April 1977	8
8.	17-page document entitled "North Monterey County Facilities Plan Draft EIS/EIR - Addendum," May 10, 1977	8
9.	Four-page document, Advertising Supplement to "Monterey Peninsula Herald," "Salinas Californian," "Valley Weekly," entitled "Environmental Impacts Hearings"	8

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10.	Four-page statement of the Monterey Peninsula Water Pollution Control Agency by Mr. Dudley Lapham	17
11.	Five-page document, Statement by Mr. Anthony Mei	30
12.	One-page document, Calculations by Mr. Earl Moser	30
13.	Multi-page bound document entitled "Marina County Water District Wastewater Disposal, Reclamation and Reuse Study, Phase 1 Progress Report," March 1977	41
14.	Three-page statement of Mr. David Berry, 18 May 1977	45
15.	Three-page document entitled "Drying Up the Toilets"	51
16.	Two-page letter to Mr. Charles S. Kahr from Mr. James L. Waters, May 17, 1977	70

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CHAIRMAN WALKER: Good evening, ladies and gentlemen. We will convene this hearing.

My name is Matthew S. Walker, and I am designated as Hearing Officer for EPA, Region IX. And this hearing is called to receive public comments on a Draft Environmental Impact Statement/Environmental Impact Report for the North Monterey County Facilities Plan.

With me this evening is Mr. Anthony Mei, Environmental Engineer and Project Officer for this project with the EPA.

The National Environmental Policy Act of 1969, which is sometimes known as NEPA, requires that a detailed statement be made of the environmental impact and effects of any recommendation or report of any major federal action.

The Federal Water Pollution Control Act, which is Public Law 92-500 of United States Statutes, requires that the Administrator of the Environmental Protection Agency encourage waste treatment management that results in desirable environmental impact effects to the extent possible on an area-wide basis.

The California Environmental Quality Act of 1970, sometimes known as CEQA, which is found in the California Public Resources Code at Sections 21082 and following, is an act similar to the National Environmental Policy Act and requires an environmental impact report whenever a state, county or local agency intends to undertake actions which may have a significant impact on the environment.

This hearing tonight is convened for the purpose of fulfilling the requirements of both the federal law and the

state law.

On November 1st, 1974, the Regional Administrator of Region IX, Environmental Protection Agency, publicly announced to the public the intention of the Environmental Protection Agency to prepare an EIS, Environmental Impact Statement, in compliance with Section 102 of the NEPA on the proposed agency action to make grants available for the construction of the North Monterey County Regional Water Pollution Control Facilities. A draft Environmental Impact Statement/Environmental Impact Report was circulated for public comment on April 8, 1977.

I have here a copy of the announcement by the Regional Administrator of November 1st, 1974, and this will, for the purpose of this hearing, be marked as Exhibit 1.

(Whereupon Hearing Exhibit No. 1, three-page letter to All Interested Agencies, Public Groups and Individuals from Paul De Falco, Jr., November 1, 1974, was incorporated into the record.)

CHAIRMAN WALKER: A copy of the Notice of Public Hearing that was published on the 15th of April, 1977, in the "Monterey Peninsula Herald" and in the "Salinas Californian" will be marked Exhibit 2 for purposes of this hearing.

(Whereupon Hearing Exhibit No. 2, three-page document, Notice of Public Hearing, April 4, 1977, was incorporated into the record.)

CHAIRMAN WALKER: The affidavits of publication by the respective newspapers, the one for the "Monterey Peninsula Herald" will be marked Exhibit 3, and the affidavit of publication for the "Salinas Californian" will be marked Exhibit 4 for purposes of this hearing.

(Whereupon Hearing Exhibit No. 3, one-page document, Proof of Publication, "Monterey Peninsula Herald," April 15, 1977, was incorporated into the record.)

(Whereupon Hearing Exhibit No. 4, one-page document, Proof of Publication, "Salinas Californian," April 15, 1977, was incorporated into the record.)

CHAIRMAN WALKER: Notice of this hearing was also given in the Federal Register, which is an official publication of the federal government, on April 29th, 1977, in Volume 42 of the Federal Register, Page 21838, and a copy of that publication will be marked Exhibit 5 for purpose of this record.

(Whereupon Hearing Exhibit No. 5, one-page document, Federal Register, Volume 42, No. 83, Page 21838, April 29, 1977, was incorporated into the record.)

CHAIRMAN WALKER: Copies of the Draft Environmental Impact Statement were mailed to a number of people representing the Environmental Protection Agency, other federal agencies, state and local agencies, interest groups, county agencies and individual citizens and citizens groups. A copy of this mailing list will be inserted in the record and marked Exhibit 6 for purposes of this record.

(Whereupon Hearing Exhibit No. 6, seven-page document, Distribution List, North Monterey County Facilities Plan EIS/EIR, was incorporated into the record.)

CHAIRMAN WALKER: The Environmental Impact Statement itself that was circulated and made available in public libraries is this volume here which may be familiar to some of you, and I have a copy here which will be marked Exhibit 7.

(Whereupon Hearing Exhibit No. 7, 596-page bound document entitled "Draft Environmental Impact Statement and Report, North Monterey County Facilities Plan, April 1977," was incorporated into the record.)

CHAIRMAN WALKER: There was an addendum to the Environmental Impact Statement that was circulated later to add further information to it, and this will be marked Exhibit 8 for purposes of this record.

(Whereupon Hearing Exhibit No. 8, 17-page document entitled "North Monterey County Facilities Plan Draft EIS/EIR - Addendum," May 10, 1977, was incorporated into the record.)

CHAIRMAN WALKER: There was a press release which some of you may have seen, and to keep the record complete, we will insert a copy of this press insertion, marked Exhibit 9 for purposes of this record.

(Whereupon Hearing Exhibit No. 9, four-page document, Advertising Supplement to "Monterey Peninsula Herald," "Salinas Californian," "Valley Weekly," entitled "Environmental Impacts Hearings," was incorporated into the record.)

CHAIRMAN WALKER: A number of letters have been received by the Environmental Protection Agency. These will not be marked separately as exhibits, but I wish to assure you if you have sent a letter in, that it is here and it will be made a part of the record, and the comments that are received in writing will be just as much a part of the record as though they were verbally and orally delivered this evening at the podium.

The record in this proceeding will be kept open until the 20th of June, 1977. That is the close of business, the 20th of June. And any comments should be received either by delivery or by mail by the close of business of that day at the EPA Regional Offices in San Francisco. They may be mailed to the Environmental Protection Agency, Region IX, 100 California Street. And if you mark them "HE-135" -- This is a mail code designation for this hearing -- it will assist in getting the mail to the proper place. We are in San Francisco, and our zip code is 94111.

That address, incidentally, is set forth in the public notice, so if you need to refer to it, you can find it there.

A verbatim transcript is being made of the record tonight by a Certified Shorthand Reporter, Mr. Tom Wilson. Eventually a copy of that record will be available for public inspection in the offices of the Environmental Protection Agency in Region IX in San Francisco. If you have a personal need for a copy of the record sooner than we can make it available, you should make individual arrangements with the court reporter.

This evening, we will hear oral testimony, and we will receive some written testimony.

We will have a further hearing, which will be a part

of this hearing, a continuation of it, tomorrow night in Salinas.

After the close of the oral part of the hearing, and after the close of all of the written presentations -- That will be on the 20th of June, 1977 -- all of this information will be assembled; it will be summarized, and it will be carefully considered by a number of people, not just the people who are here tonight. The decision makers at the agency will have an opportunity to review the raw data, the information and the summaries. A decision will be made on any issues involved as a result of those summaries, meetings, conclusions and studies, and a final Environmental Impact Statement and Environmental Impact Report will then be prepared and published.

Now, we are here tonight to listen to comments. We are not here posing as the ultimate experts on all phases of this or any other project. We may have information that is of interest to you, and we may be able to respond to your questions. It may also be, however, that some of the questions that you have are not those that we are able to answer, either from a policy standpoint or because we don't have the information. However, if you ask your questions and ask them on the record, they will be addressed in the final Environmental Impact Report and Environmental Impact Statement. All comments will be addressed at that time.

Now, we do ask you when you are talking here tonight to use the podium. We have a microphone over there. It is convenient to the court reporter. And we are making a record of this. We have found from experience that it's a little bit difficult to get a good record and to really understand what is being said from the audience unless you come forward. When you do come forward, please give us your name; and if you are appearing in a representative capacity, we would like to know that, too, and who it is that you are representing.

Another thing, if you have a written statement and you wish to simply submit the written statement, it will be given every bit as much consideration as if you stand at the podium and read it to us word for word. This would be somewhat appreciated by us, and possibly highly appreciated by the other members of the audience if your statement is long. I assure you that it is not necessary to read verbatim written statements. You may, of course, if you wish, but it isn't necessary.

I'm not going to set any time limits on speeches tonight. However, we do ask you not to unduly extend your remarks and not to repeat what others have said. Just arbitrarily, if you are talking much over ten minutes, we may ask you to bring the comments to some sort of summary and conclusion. But we are not insisting upon a time limit.

Now, as to the procedure that we are going to follow tonight, I will call upon Mr. Dudley Lapham of the Monterey Peninsula Water Pollution Control Agency. After that, I will call on Mr. Mei of the Environmental Protection Agency. I will then call upon a representative of Engineering Sciences, Inc., the consultant on this report, Mr. Jerry Cole.

After that, if there are any elected officials who have requested an opportunity to speak, I will call on them. After any elected officials have been given an opportunity to speak, we have a procedure that rotates the speaking opportunities among representative groups.

As you entered the door, you had an opportunity to fill out a registration card. We request that everybody fill out a registration card. It is a public meeting and, of course, you may attend anonymously. It is not required that you do in any way fill out a registration card, but we do like to know who is here. It helps us to assess our impact on the public and the public's impact on us.

But if you are going to speak, I do request that you fill out one of these cards with the young lady at the rear of the room and check the box marked "Yes" indicating that you do wish to speak. I will then call upon those who have indicated a desire to address us in this order:

First, unaffiliated private citizens.

Second, representatives of public agencies.

Then representatives of special interest groups or associations.

Then representatives of business, commercial and industrial firms.

A card will be taken from each of these groups as nearly as possible in rotation and in the order in which you registered.

I will now call on Mr. Dudley Lapham, Manager of the Monterey Peninsula Water Pollution Control Agency. Mr.

Lapham?

MR. DUDLEY LAPHAM: Thank you, Mr. Walker.

If I may, I will just take a few moments and try to set a brief background for the setting which is the essence of your hearing this evening. The presentation, copies of which I have provided to the staff:

In background, the Cities of Monterey and Pacific Grove and the Seaside County Sanitation District, which is composed of Del Rey Oaks, Sand City and the major portion of the City of Seaside, are operating sewerage treatment plants for their respective jurisdictions. These old systems, plants built in the early 1950's, with some subsequent modifications, do not comply with current regional, state and federal wastewater standards. In the early 1970's cease and desist orders were imposed. The entities responded with bond issues to fund improvements to meet the then-current requirements and initiated a joint powers agency, the present Monterey Peninsula Water Pollution Control Agency, with all three entities as participants in February 1972. The JPA was formed as the initial planning vehicle to secure an acceptable areawide solution to water pollution control for the five South Bay municipalities.

Also, in 1972 major amendments were enacted to the Federal Water Pollution Control Act, PL 92-500. The State Water Resources Control Board, through its Regional Water Quality Control Boards, was actively implementing the directives of the Porter-Cologne Act, January 1970, which established statewide policy for the control of water quality.

Further major environmental legislation of the late 1960's and the early 1970's -- NEPA, CEQA, CCZCC -- generated additional guidelines for pollution control operations. These supplemented concerns of the State and County Health Departments in enforcement of provisions of the California Administrative Code.

In all this, primary to our local concerns were:

1. Requirements for rapid conversion to secondary level treatment.

2. The establishment by the State Board of a discharge prohibition zone drawn from Point Pinos to the mouth of the Salinas River.

3. The fundamental mandate of PL 92-500 that "no pollutants" will be discharged to the waters of the US by 1985, and

4. The means of funding mandated improvements.

In this latter respect, PL 92-500 authorized federal assumption of 75 percent of the cost of construction of municipal wastewater treatment works. Similar legislation -- The Clean Water Bond Laws of 1970 and 1974 -- was promulgated by the state, permitting 12 and a half percent state participation. These federal and state grants are processed under the Clean Water Grant Program administered by the State Water Resources Control Board.

The Monterey Peninsula Water Pollution Control Agency was an early recipient of a planning phase grant under this program, with local share contributed on a self-imposed allotment system by the member entities.

With state approval, early plans were developed on the basis of the Tri-Cities concept of tieing the plants together with an ocean outfall at Point Pinos. Subsequent regional studies resulted in the Central Coastal Basin Water Quality Control Plan of May, 1974, which specified a consolidated wastewater management approach for the Monterey County communities bordering the Bay. The recommended plan for the Monterey Peninsula, Salinas and Castroville area municipal wastewater flows with construction of a regional treatment plant and outfall facility for discharge to Central Monterey Bay and/or reuse of reclaimed wastewater for crop irrigation and possible enhancement of the lower Salinas River water quality.

To comply with the Basin Plan, the MPWPCA abandoned its original plans and secured a facilities planning grant in conformance with the new approved concept. Monterey County and the City of Salinas joined the agency as full participants in the regional planning phase. Fort Ord and the Marina County Water District have served as ex-officio members. The regional facilities plan is nearing completion.

In accordance with the staging provisions of the Basin Plan, plans and specifications were developed for the Pacific Grove-Monterey Consolidation Project, Stage 1, and construction will start this month.

The project we will discuss tonight will be funded by a 75 percent grant from EPA and 12 and a half percent grant from the State Water Resources Control Board. The local share of approximately $14 to $15 million will come from the

sale of sewer bonds which will be amortized by the District through a sewer service charge on all users. Note particularly that any resident or commercial enterprise in the District not receiving service from the District will not be taxed or charged.

Large industrial users will not benefit from the federal and state grants. They will be charged a service charge which includes the grant portion to be returned to the federal government over a period of years.

The District does not intend to impose a tax on real property. All of its revenues will come from service charges. Taxes presently being assessed by municipalities or districts for sewer services will be reduced or eliminated when the District is fully operational.

I would like to emphasize that in the project planning process our agency studied every feasible alternative: a total of some 170 possible different solutions. We evaluated and compared them from an economic, environmental and engineering standpoint. The five alternatives discussed in the draft Environmental Impact Statement were selected as those most likely to meet regulatory standards at the minimum cost over the life of the system and with the least disturbance to the local environment.

Thank you.

CHAIRMAN WALKER: Thank you, Mr. Lapham.

Do you have copy of your remarks?

MR. LAPHAM: I do have an extra copy.

CHAIRMAN WALKER: All right. I will insert a copy of the remarks into the record and mark them Exhibit 10.

(Whereupon Hearing Exhibit No. 10, four-page statement of the Monterey Peninsula Water Pollution Control Agency by Mr. Dudley Lapham, was incorporated into the record.)

CHAIRMAN WALKER: Mr. Mei?

MR. ANTHONY MEI: Thank you, Mr. Walker.

Good evening, ladies and gentlemen. As you have heard, my name is Anthony Mei, and I want to thank you for coming tonight. Your participation in this hearing is valuable and vital to the Environmental Impact Process. The Environmental Impact Statement was prepared to inform you about what the impacts of the project are expected to be, that is, the environmental, social and economic impacts. The primary reason for this hearing, though, is to hear your ideas, your feelings, and your comments on the Monterey Regional Wastewater Project.

As Mr. Walker noted earlier, this hearing is being conducted to fulfill the requirements of several state and federal laws. This hearing is also a step in the procedure for obtaining grant assistance from the federal and state governments for the construction of water pollution control facilities. Ideally, after these hearings are closed and all comments are responded to, the Environmental Impact Statement will be completed. At that point, a decision will be made whether or not to offer grant monies for design and, subsequently, construction of the proposed facilities.

Tonight I would like to summarize the Environmental

Impact Statement for you. I will briefly cover the purpose of the project, the alternatives that were evaluated, and the major impacts of the project.

This project is designed to improve water quality by improving wastewater treatment service to residents in the Southern Monterey Bay/Lower Salinas Valley Region of Monterey County. The major objective of the project is to eliminate public health hazards and water quality problems being caused by existing wastewater discharges to Monterey Bay and the Salinas River, which also impact the Tembladero Slough and Elkhorn Slough.

The project also seeks to reuse treated wastewater for irrigation of crops in the Castroville area to reduce overdrafting of the groundwater table and to assist in curtailing salt water intrusion in the lower Salinas River Valley. Landscape irrigation of the Monterey Bay Peninsula is also being considered.

Mr. Jerry Cole will elaborate on the specific alternatives later. Basically, a regional treatment plant north of Marina is proposed. This will ultimately entail abandoning eight existing local treatment plants and connecting them with interceptor pipelines to the regional plant. Several levels of treatment have been considered, and four methods of disposal are suggested, each having irrigation reuse as a further option. The two most feasible methods of disposal are an outfall discharging to Central Monterey Bay and an outfall discharging to the Lower Salinas River. Both discharges would occur during the nongrowing season when irrigation reuse is impracticable.

The beneficial impacts of this project are the elimination of public health hazards in the Bay and river, the improvement of water quality and the reuse of a valuable resource for agricultural irrigation.

The adverse impacts of this project include the traditional primary construction impacts and several significant secondary (indirect) impacts. The construction impacts are temporary and include traffic, residential and commercial disruption; creation of noise and dust, and the elimination of grasslands and grazing areas north of Marina.

The secondary impacts are directly related to the population growth accommodated by the capacity of the proposed facilities. The additional 98,000 people by 1995 will have the following impacts:

First, increased demand on the already limited potable water supply.

Second, increased air quality problems in the area, and

Third, loss of prime and unique agricultural land to development.

It should be noted that, in all alternatives considered, except for one, all discharges to the Salinas River will be removed. The impact of this is double-edged. That is, it may be beneficial, yet adverse, at the same time.

The reclamation option, the irrigation reuse, is currently an unresolved issue. A demonstration project is now underway to determine the effects of using reclaimed

water on produce crops.

I would like to point out that the population and air quality addendum noted in the Draft Environmental Impact Statement was mailed approximately a week and a half ago. This was already entered into the record, I believe as Exhibit 7?

CHAIRMAN WALKER: Exhibit 8.

MR. MEI: Exhibit 8.

In conclusion, this project is associated with significant environmental issues concerning water quality, air quality, agriculture and public health. Your input is essential to this process. Therefore, this hearing is being conducted for your benefit. This is your opportunity to comment on a proposed project which impacts the region in which you live.

Thank you.

CHAIRMAN WALKER: Thank you, Mr. Mei.

I will now call on Mr. Jerry Cole of Engineering Science, Inc.

MR. JERRY COLE: My name is Jerry Cole. I am with the firm of Engineering Science, consulting engineers.

I think I would like to clarify our role in the planning process. We were retained as consulting engineers for the agency to conduct the facilities plan, which is basically the engineering element of the planning process. And we have prepared this document which has been available for review, which is the Facilities Plan for North Monterey County Draft Facilities Plan Report, which was available in

July of 1976.

Mr. Walker alluded to us preparing a report, and I didn't want there to be some confusion. We did not prepare the Environmental Impact Statement/Report, although we did work very closely with an independent consultant which was retained by the agency.

May I have the slides? I have a few slides that I would like to show to summarize the planning process and show the five alternatives that were screened and then the recommended plan.

(Slide No. 1.)

The study area evaluated consisted of about 300 square miles in North Monterey County. There are seven publicly owned treatment plants and one privately -- one plant owned by the Fort Ord Military Reservation. Our charge was to evaluate alternative wastewater management systems to project the beneficial uses of receiving waters and to comply with all the regulatory restraints, some of which Mr. Lapham has already alluded to.

As you can see, with a number of plants to be either upgraded or combined, and a number of disposal options, namely to the ocean, to the Salinas River or to the land, there were literally thousands of combinations of alternatives that could be evaluated. Nevertheless, we developed 175 initially. They were screened by the agency's, independently by the agency's environmental impact consultants as well as ours, and the agency's Technical Advisory Committee, composed of staff persons from throughout the agencies in the district. They

were screened down to 145 alternatives.

Engineering economy analyses were made on the 145 alternatives. And we further screened down both economically and, once again, environmentally to five alternatives that appeared to have the best economic advantages, as well as non-quantifiable advantages, such as environmental impacts, implementability and other issues.

Now, the five alternatives screened were -- And I will take them in order.

May I have the next slide, please?

(Slide No. 2.)

One involves regional consolidation of all waste facilities at a regional plant near the mouth of the Salinas River with ocean discharge, as you see here (indicating). It's a regional plant and outfall.

The economic evaluation consisted of presenting both capital costs, operating and maintenance costs, and total present worth dollars. This alternative had a total present worth cost of $55.6 million.

May I have the next slide, please?

(Slide No. 3.)

This alternative involved a regional consolidation at a treatment plant near the mouth of the Salinas River with tertiary treatment discharged to the Lower Salinas River during nongrowing season and irrigation combined with the proposed Castroville irrigation project during the growing season.

This project had a present worth cost of $68 million.

May I have the next slide, please?

(Slide No. 4.)

The next alternative studied involved a regional treatment plant near the mouth of the Salinas River, consolidation of all waste flows; therefore, tertiary treatment. Wastewater would be combined with the Castroville irrigation project for crop irrigation during the growing season and discharged via an ocean outfall into Central Monterey Bay during the non-growing season.

This project had a present worth cost of $60.1 million.

These present net worth costs are expressed in 1975 dollars. That was the year in which the economic analyses were conducted.

Next slide, please?

(Slide No. 5.)

This is somewhat similar to the previous alternative in that there is a regional consolidation of the teritiary treatment plant near the mouth of the Salinas River. The yellow line you see there is the pipeline proposed for the Castroville irrigation project. You will note that there is a tie-in with our project to that yellow line, or the Castroville irrigation project.

That area I just pointed out is a surface storage reservoir to store the wastewater during the Wintertime when irrigation would not be practiced in order to save all the water for irrigation on a year-round basis.

The present worth cost of that alternative is $71.2 million.

(Slide No. 6.)

And the fifth of the five alternatives screened in great detail is similar to the previous one, except that instead of a surface storage reservoir, an underground storage reservoir was proposed, symbolized by that inverted hatched triangle. This was an offshoot of a study that was conducted by the US Army Corps of Engineers in its urban studies for the Monterey area in 1975, wherein it was proposed to percolate wastewater into the perc water aquifer for storage and repump it out during periods of irrigation demand.

This alternative has a total present worth cost of $53.5 million.

After the detailed evaluation was conducted, both economically and with the assistance of the environmental consultant, Alternate 166 was selected as the most cost-effective option. It was selected by us. Let me make that clear. That was our recommendation, and the environmental impact consultant, I believe, has made no recommendation.

May I have the next slide, please?

(Slide No. 7.)

This would show under that concept the ultimate regional sewerage system. The yellow area shows the ultimate sewer area where all this wastewater would be collected and conveyed through regional interceptors to a regional tertiary treatment plant near the mouth of the Salinas River. Wastewater would be routed to the Castroville irrigation project for reuse during crop irrigation season. The service area of that project is delineated by the green area, which is also known as Zones 2 and 2A of the Monterey County Flood

Control and Water Conservation District. It's approximately 9,000 acres. And in the Wintertime when irrigation demands were very low, the wastewater would be routed by an ocean outfall to Central Monterey Bay.

Total construction cost of the regional system, $80 million.

That concludes my remarks.

CHAIRMAN WALKER: Thank you, Mr. Cole.

We have now come to the part of the program where we hear from the public. As I had previously announced, we were receiving registration cards for those who wished to address us. I have been handed two. And the first, according to our procedure, will be Mr. Earl Moser.

MR. EARL MOSER: My name is Earl Moser. I am speaking tonight as a private citizen, but I have been interested in this project for many years, particularly since for two years I was Chairman of the Carmel Sanitary District, and for four years was a member of the board for that district and, as such, our board and its staff and other people examined the possibilities of disposal of treated effluent on land rather than discharge into bays or estuaries or along the seacoast.

I want to start this evening by saying that this EIR is the best EIR or EIS that I have seen in Monterey County. And I have seen quite a number of them. It's comprehensive; it's factual, and it does not shrink from pointing out environmental consequences. I want to congratulate and commend the several people who prepared it.

Now, I indicated when I started speaking here that my outlook is favorable towards this project, and I wouldn't like anything I have to say to be interpreted as being adverse to the project. I think in general it's good, and I think it should be carried out.

The remarks I have to make, however, concern one of the, call it, indirect environmental effects that would be associated with this project. I am particularly interested in the quality of air in this county. I think I should tell you that. I have been interested in quality of air ever since about 1952 when I sat in a classroom at California Institute of Technology and watched Dr. Hagenschmidt, Laurie Hagenschmidt, produce smog in an inverted glass bowl. He was the man who discovered how photochemical smog is produced, and he told us -- And we have all learned since then -- that it is produced when unburned hydrocarbons, now called reactive hydrocarbons, and oxides of nitrogen, both of which are emitted from the exhausts of automobiles, are acted on by sunlight in the atmosphere and a chemical change is produced which results in the smog that we are all acquainted with.

Now, I want to call attention, first of all, to the statements made on Page 294 of the report, and I might say right now that all of my remarks are in light of the revised supplement to this report which was sent out a week to ten days ago. On Page 294, I will read one short paragraph.

> "The major concern regarding future air quality in Monterey County centers on oxidant levels. Thus, all revisions to the air quality analysis presented in

Appendix A-5 focused on hydrocarbon and nitrogen oxide emissions and subsequent oxidant and NO_x levels."

So I'm talking about that kind of air pollution. You are all acquainted with the fact that the federal government sets a standard of .08 parts per million of oxidant as the point which is the danger signal with respect to air pollution. I mention that because that standard is not being met at the present time in Monterey County.

I also call attention to the fact that, in the projections which so excellently are set out in this Environmental Impact Report, the projections involving future population, future number of automobiles or, rather than future number of automobiles, projections of vehicle miles traveled, in the next 20 years, in not one of those years will the federal standard be met. To me, that is very serious. To me, that means that this project and every project which will result in this upward population and automobile curve continuing must be accompanied by mitigating factors.

And that's really why I'm here tonight: not to say that this project should not be carried out, but to say that, when it is carried out, there must be mitigating factors.

Maybe one would be the sizing of the plant as is mentioned in the report. Maybe another should be the establishment -- And this I certainly would strongly support -- the establishment of an air pollution maintenance area which, in effect, means that the area must produce a plan for reducing the elements that cause photochemical smog. That

certainly should be adopted.

Our local people have consistently hindered the adoption of such a plan, which is still under investigation and hopefully will be declared for this district.

Now, just one point in connection with this report and a suggestion about the report.

The report has a chart on Page 302 which shows oxidant levels from 1975 to 1995, and that chart shows that in none of the years between those two dates is Monterey County going to meet the federal air pollution standards. My suggestion is this: that, bad as that chart is, it is still too optimistic, and I'm going to ask that the people who prepared this report review their projections, because a part of their projections had to include this factor. Automobiles are required to reduce the quantity of hydrocarbons and oxides of nitrogen to be emitted. The ultimate standard is .4 grams per million for each. The standard is to be attained by various steps.

The automobile manufacturers have been able so far to get postponement of meeting each of those steps. They will continue to ask for postponement. And when 1995 comes, I'm very doubtful that the ultimate step will have been attained.

These projections, I feel satisfied, assume that sometime before 1995, .4 grams per mile per car will have been attained. I think all of the steps used in here have been too optimistic, and I say that after applying one check to these figures, and this is the check. And I am going to hand this to you so that it can be used for recalculation.

But by 1995, it is estimated in the report the number of vehicle miles will have increased from -- I'm using very round figures -- approximately today's four million miles per day to 1995, eight million miles per day. All right.

Now, if each of those eight million miles, vehicle miles, emits only four grams of hydrocarbons per mile, then, as I work out the figure, the amount of pollutants emitted into the air by the automobile will be by several tons greater than the figure which, in another table in the report, says will be the quantity in 1995.

The relative figures are these. If four grams per mile is emitted in 1995, then the total hydrocarbon emissions would be 32 metric tons. Any of you high school arithmetic people can figure that out. And 32 metric tons is approximately 29 -- a little bit more than 29 short tons, which is the figure that is used in the report. However, the figures in Tables VII and VIII for 1995 show emission of hydrocarbons by all vehicles, by all motor equipment, one table shows 23.7 tons and the other 26.4 tons.

Now, obviously someone was a little too optimistic in their final figures. So I repeat: this chart is too optimistic. The picture is even worse than is set out here, and both because of this project and other projects which will result in increasing numbers of people and increasing numbers of automobiles, mitigating factors must be adopted, either by the community, by the state or by the federal government.

Thank you very much.

CHAIRMAN WALKER: Thank you, Mr. Moser.

Did you say you had some calculations you wanted to hand in to us?

MR. MOSER: Yes.

CHAIRMAN WALKER: Thank you. I will mark these calculations Exhibit 12.

For the record, I have a copy of the comments by Mr. Mei. They will be marked Exhibit 11.

(Whereupon Hearing Exhibit No. 11, five-page statement of Mr. Anthony Mei, was incorporated into the record.)

(Whereupon Hearing Exhibit No. 12, one-page document, calculations by Mr. Earl Moser, May 17, 1977, was incorporated into the record.)

CHAIRMAN WALKER: And also for the record, I was assured that prints of the slides that were shown, the seven slides that were shown, will be prepared and submitted later to be a part of this record, and they will be inserted in the record at that time.

The next person that I have to call on now is Mr. Charles Kahr. Did I pronounce your name right?

MR. CHARLES KAHR: Yes, right. Kahr, K-a-h-r. Thank you, Mr. Walker.

My name is Charles Kahr, and I work for George S. Nolte and Associates of San Jose, and we act as the District Engineer for the Marina County Water District in the capacity as their District Engineer.

Marina County Water District, which was formed roughly in 1960, already has secondary treatment. They started in the early 1960's, when they built their first plant, which was a one mgd plant, to serve the City of Marina. At that time that wasn't even a city. It was in the county. At that time they put in a treatment plant, a one-mgd treatment plant, and the collection system to collect all the sewage from Marina and dispose of it into Monterey Bay as secondary effluent, the same level of treatment as proposed by the regional system and disposal to Monterey Bay.

In the last two or three years, they put in another unit which just went on line two or three months ago, which was a second unit, doubled the size of their plant to two million gallons per day. That plant just went on line roughly two to three months ago and now will serve Marina County Water District's ultimate population past the year 2,000.

So Marina County Water District already has secondary treatment to serve the ultimate population of Marina, a brand new treatment plant.

What is the problem with Marina County Water District? Their effluent disposal line, an outfall into Monterey Bay, extends out roughly 2500 feet, a half mile. What is the problem? The discharge limit line produced in the Coastal Basin plan calls for discharge approximately 12,000 feet out, no discharge between Point Pinos and the mouth of the Salinas River. So Marina would have to extend their outfall roughly 10,000 feet to get outside the discharge limit

line. The thing is Marina doesn't have any health problems. There are no records showing any health problems on Marina's beach because they already have secondary effluent. Their treatment plant is not overtaxed. They run it at half capacity right now because only one mgd flows through there on an average day. So there is no problem on the beach. They extend out farther than the other outfalls in the Monterey Peninsula. So really there is no health problems.

But to meet the state requirements, Marina County is in the position if that's the only alternative available, they would extend their outfall. But the Board of Directors at Marina County Water District saw this plan for a regional system which would buy their treatment plant, pay them $2 million, $2.3 million to buy them out, buy their brand new treatment plant and demolish it, pump their effluent up to a regional treatment plant which is only two miles to three miles from Marina.

So Marina Board of Directors said, "Wait a minute. There are some alternatives available to us. How much is it going to cost the people in Marina who already put out the bucks to produce a nice plan?"

So we produced a study, "Wastewater Disposal, Reclamation and Reuse Study," produced for the Marina County Water District. I personally prepared the project. And to make it fair to everybody, I used everything that was used in the Environmental Sciences Report. I used their cost estimating curves. I used their population projections. I used their level of treatment. I used their discharge limit line, to keep everything fair.

What did we find? We found that there are alternatives available to Marina that are cheaper than joining the regional system. The regional system's going to take effluent from Monterey, Seaside, Sand City, Fort Ord, Salinas, pump it all to a treatment plant that's two miles from Marina.

So what can Marina do? The alternatives we looked at were:

1. Join the regional system. How much would it cost them? We found out how much it would cost them based on their projections, their cost estimates on the service charges.

2. Extend the outfall. Using their curves, which showed how much it cost to construct an outfall into Monterey Bay, we found out what those costs would be.

Other alternatives that we looked at, which weren't addressed in the Engineering Science Report, or the Environmental Impact Report, which we have since found out the state thinks is a pretty good idea, why not have Marina just pump their effluent up to the regional system's outfall. Marina has secondary effluent. The regional system has secondary effluent. They are both pumping to Monterey Bay. Why not go up the coast a ways and look into it. Don't demolish Marina's plant. Continue their own operation of secondary effluent, dump it in the Bay.

Two alternatives there. One, hook up at the coastline or, two, so their effluent could be used for

reclamation at some future date, pump it up to the regional treatment plants.

Other alternatives, all those alternatives I mentioned appear to be cheaper in cost to Marina than joining the regional system, assuming less degree of grant funding than the regional system produced.

If you look at their figures, they are talking about a local share on the order of 17 percent, somewhere in that region, as the cost to pay. They keep talking about 75 percent EPA money, 12 and a half percent state money, 12 -- Excuse me -- and the other 12 and a half percent local money. Well, what they don't tell you is that's not what you get. You don't get that because they only will pay for grant-fundable items.

What are grant-fundable items? Items that meet their population projections. They will only pay, let's say, the size of the plant to cover the next 20 years of population growth, not the ultimate growth. So they are going to build the system that will produce some ultimate growth past the year 2,000. So you see that, in actuality, you don't get that grant funding. It may only be 60 percent is paid by the federal and the state, or 70 percent, some different figure. But it really is, indeed, not the 87 and a half they talk about.

For our study to assume grant funding, we looked at it. How much is the population projection that Marina calls for? How much is it likely to be? We assume 66 and a half percent for some of the items. The other ones were even less than that.

So what do we see? We see that there are alternatives that are available that are cheaper. There are also alternatives that are available that are more expensive than joining the regional system, but Marina is willing to go to. They include wastewater reclamation. Same type of thing called for in the regional system, but don't take it to Castroville irrigation project; take it to the area north of Marina. There is some area there that's currently used for grazing land, and irrigate that area. That area, when it develops, will be using water from the aquifer which now serves Marina County Water District.

Marina County Water District doesn't have a water problem right now. They are pulling it out of the groundwater. They are not bringing the water from Carmel Valley. They are not on rationing. But they are already doing measures to produce a less amount of water needed. They are using reclaimed water to irrigate the freeway during construction, to cut down the amount of water the contractor has to use, and other items that are being developed now.

As you see, they are willing to move ahead. They produced secondary treatment in the early Sixties, and they are going ahead with wastewater reclamation. The alternatives are more expensive.

We looked at reclamation; we looked at injection in the groundwater; we looked at irrigation and dumping into the Salinas River, a number of alternatives, all the way up to food crop irrigation, which is a separate item I will discuss

in a minute.

We also prepared this report, and we want to know what is the effect on the regional system if Marina doesn't join. Using their figures, it's going to cost them $2.3 million they will have to pay the Marina County Water District to buy them out. And that's only the treatment plant. Marina will still be responsible for collecting the sewage and bringing it to a certain point. Then it will go into the regional system. $2.3 million.

A second item that was looked at is the cost that the regional system calls for for taking the effluent from the existing treatment plant over to their main interceptor that takes it off. That's another half a million dollars, using their costs.

Other items, you have to build a bigger sewage treatment plant to serve Marina, even though Marina's total is only three to five percent of the total volume of the whole Monterey Peninsula and the Salinas area comes out to be. Using their figures, they are going to have to pay $5 million to include Marina. Alternatives we looked at are much less than that.

To extend the outfall's only about two and a half million dollars. So you see there are alternatives available.

The one that the state agrees with, saying is a good idea, is hooking up to their outfall. They never even looked at that.

Marina's position is they don't want to join the regional system. A petition has been signed by over 700 people from the Marina County Water District area saying they don't want to join the regional system. And that was only canvassing part of the city with a population of 10,000. So you see the problem.

Other items I will go into, talking about the EIR. One last item on the irrigation of food crops. What does the regional system plan to do? Take the effluent to a treatment plant just north of Marina, secondary effluent, and dump it into the Bay. That's how it stands right now in the first stages of development.

They have a pilot study that will look at irrigation of food crops: artichokes, lettuce. It's a pilot study to see if it's feasible. The problem is the state won't allow them to do that now. They will not allow you to irrigate unprocessed food crops with tertiary treatment, and the Health Department won't allow you to do that. So they are banking on the results of this tertiary treatment pilot study being a success and being allowed for the irrigation to the Castroville irrigation project.

The EIR points out a couple of problems about the Castroville irrigation project. The only way it's economically feasible is if they can get a four and a half percent loan for 35 percent of the project and a zero percent loan for the other 65 and a half percent, the loan being from the Bureau of Reclamation, US Bureau of Reclamation, which has not approved the loan yet. It's been applied for, but no approval's been allowed.

The EIR says if they don't get that as an alternative

for the Castroville irrigation project, some other disposal site will have to be looked at and the cost of all the alternatives will increase.

Other comments in the EIR I would like to address. There was a moratorium in Marina on new sewer line connections. The report does not say that it's now been dropped three to four to five months ago when the second unit went on line.

The EIR says an outfall for Marina is not feasible economically. We used their cost figures. We showed that it is economically feasible. It doesn't specifically comply to the basin plan which calls for a regional system, everybody dumping out at one place, but it does meet all the other requirements that will dispose outside of the disposal area that's prohibited.

A couple items of a technical nature that were not really addressed in the EIR. They did mention that the diffuser that they plan, which is sewage goes down underneath the water and it's supposed to come out a certain velocity so that it doesn't affect the fish around it. There is to be a dilution in the ocean. It says that it does not meet the ocean marine requirements, which it doesn't. The cost estimates are all assumed on a diffuser that does not meet the state requirements. It's banked on that the state will reduce their requirements to allow their disposal through that diffuser, or a much more expensive diffuser would be required. It's five or six times as long, which raises the costs many millions of dollars.

As I said, the tertiary irrigation is not accepted by the state now, of unprocessed foods, such as the artichokes and lettuce, and they are banking on their disposal or their pilot plant, which has a seven-year life, so nothing's going to happen until at least seven years after that before a tertiary reclamation project can go.

The Castroville irrigation project, as I said, as mentioned in the report, is based on a low-interest loan. The costs included in the EIR do not include the cost of the tertiary treatment plant. The revenue program does not include the cost of the tertiary treatment plant in determining their service charges to the various agencies.

I used service charges they put into their report, which are based on a certain amount of water that you use, but that's all. These other charges that would be added on, they don't address those, how much they will actually be if they can't get the Castroville irrigation project.

They say they are not going to charge property tax. But they have the power to. Who's going to pay for all these additional costs of the delays in the project. The Pacific Grove-to-Monterey plant is already way behind schedule. In this project, they call for starting construction early in the 1980's. It's doubtful if they are ever going to get that in, and all their costs are based on '75 costs, '76 costs. Escalation is going to really kill them by the time this project is actually going.

They have a hook-up charge for new development, $800 for each hook up. Marina now charges $400. If they join the regional system, they can't charge $400 anymore.

Nobody is going to come along with that $800 one. So they are to charge higher user rates to the people.

Marina never signed the joint powers agreement. Marina did attend, had a representative on the technical committees. He did bring up the points that Marina's outfall should be looked at in detail. He was overruled.

What is the effect on the garbage dump? Where is the garbage dumped? That's where the treatment plant is going to be in their alternative. You have a garbage dump up there, and they plan to take 50-60 acres off that garbage dump. And assuming the right-of-way is going to be of minimal costs, there is no right-of-way in the cost projections. Who's going to pay for the garbage dump? Are they just going to transfer it from one agency to another agency? Who paid for it in the first place? You did.

What is the effect on the garbage dump as far as the -- where is the garbage going to go when one part of it's filled up and this other part now has a treatment plant on it?

Also, the Castroville irrigation project is not going to help the Monterey water supply. They pull out of groundwater. Monterey pulls out of the Carmel Valley water.

Also, they talk about reuse of effluent in the Monterey Peninsula for golf courses and all these other items. Those costs have never been addressed. They have never been included in the report. They have been in the supplemental reports, but not in the EIR.

As a separate item, I noticed on Alternative 170 the

EIR actually says 900 acres of storage of the surface reservoir on the area immediately south of the wastewater treatment plant. It appears in the slide showing a site on the Fort Ord Military Reservation, which is unclear. I assume that he meant the Armstrong Ranch area, which is subject to problems there in that it will be developed within the future period of time. And how much that will cost for that right-of-way.

I will submit a copy of this report, and I will be submitting written comments prior to the deadline date on everything I have said.

CHAIRMAN WALKER: Thank you very much.

A copy of this report, titled "Marina County Water District Wastewater Disposal, Reclamation and Reuse Study, Phase 1 Progress Report," dated March 1977, prepared by George Nolte and Associates, will be marked Exhibit 13 for purposes of this record.

(Whereupon Hearing Exhibit No. 13, multi-page bound document entitled "Marina County Water District Wastewater Disposal, Reclamation and Reuse Study, Phase 1 Progress Report," March 1977, was incorporated into the record.)

CHAIRMAN WALKER: The next card is that of Mr. David Berry.

MR. DAVID BERRY: My name is David Berry. I work for Kennedy Engineers who work for the Carmel Sanitary District as their District Engineer.

I have a brief prepared statement I would like to read into the record, and I will just proceed.

The following comments are made for the Carmel Sanitary District by Kennedy Engineers.

After briefly reviewing the Monterey Peninsula Water Pollution Control Agency's facilities plan Interim Report No. 6, dated March 1977, and the Supplement to that report, dated April 1977, we wish to point out what appears to be an area of potential conflict with substantial ramifications to the Carmel Sanitary District.

Specifically, this area of potential conflict is the proposal contained in the aforementioned reports that the Monterey Peninsula Water Pollution Control Agency supply reclaimed water to the Del Monte Forest area for irrigation purposes. While we recognize the desirability of utilizing reclaimed water for irrigation purposes, the proposed project by the agency may preclude consideration by the Carmel Sanitary District of providing reclaimed water to much of the same area.

It is not surprising that both agencies are interested in reclamation projects in the Del Monte Forest. The Del Monte Forest golf courses offer particularly attractive sites for beneficial reclaimed water use because they are easily accessible, relatively flat, lie in close proximity to one another, and are one of the few activities on the Peninsula which can use large volumes of reclaimed water. Further, reuse of water for irrigation of the golf courses in Del Monte Forest would allow potable water presently required for irrigation to be used elsewhere.

In view of the different facilities plan schedules and the potential cost savings which could be realized by the agency if a timely decision is made, we believe that it is desirable to make a joint evaluation of reclamation/reuse of wastewater in the Del Monte Forest which would examine the issue from a regional perspective.

The following questions should be resolved as part of such an evaluation before a decision is reached.

First, how do the costs, social, monetary and environmental, of supplying reclaimed water to the Pebble Beach golf courses from the Carmel Sanitary District compare with those of the Monterey Peninsula Water Pollution Control Agency's Alternative 11 in the report I mentioned?

2. Should reclamation to the Castroville area prove successful, will the Monterey Peninsula Water Pollution Control Agency continue to supply effluent to the Pebble Beach golf courses?

3. The State Water Resources Control Board has mandated that the Carmel Sanitary District and the Pebble Beach Sanitary District, as a joint participant in the treatment and disposal system, study methods -- Excuse me -- study methods of removing its present discharge from Carmel Bay. One of the most attractive options at the present time is to maximize reclamation. What effect would the agency's serving reclaimed water to the Del Monte Forest area have on the District's ability to comply with the State Board's order?

4. The State Public Utilities Code, Sections 1501 and following, limits duplication of service within an existing water service area. Has the policy of the California-American Water Company been determined, and will their policy affect either the agency or the Carmel Sanitary District in serving reclaimed water in the Del Monte Forest area?

5. Under what conditions would the golf courses be willing to accept reclaimed water?

6. What will happen to the quantity of potable water currently being used for golf course irrigation?

It is recognized that decisions need to be made in order to move ahead. The current drought certainly reinforces the necessity for wise stewardship of our water resources and recognition that reclaimed water can be an important part of these resources.

However, it is important for all involved that an adequate evaluation of alternatives of wastewater reclamation, including those involving the Carmel Sanitary District, be accomplished prior to proceeding with the implementation of a reclamation project for the Del Monte Forest area. Results from the Areawide Facilities Plan planning efforts by the Carmel Sanitary District should be most useful as part of such an evaluation, and these results can be made available.

The District feels that through cooperation and effective planning, the water -- Excuse me. The District feels that through cooperation and effective planning the water and reclaimed water resources of the Peninsula can be allocated most efficiently and effectively.

Thank you.

CHAIRMAN WALKER: Thank you, Mr. Berry.

MR. BERRY: Here is a copy of my statement.

CHAIRMAN WALKER: And we will mark a copy of your statement as Exhibit 14 for purposes of this record.

(Whereupon Hearing Exhibit No. 14, three-page statement of Mr. David Berry, 18 May 1977, was incorporated into the record.)

CHAIRMAN WALKER: I come now to the card for Miss Gail Christen.

MISS GAIL CHRISTEN: Hi. I'm a private citizen. Thank you for this opportunity to express myself.

There is something that's been on my mind since I read about it in the newspaper supplement, and it's obvious that there is a lot of problems with the water treatment plant and the solutions that have been brought up, and I would just like to suggest that for some people, there might be a simpler method. It distresses me, like the rainwater goes into the sewage system and in the cities and -- and I don't like to see huge cement plants and -- It's frightening to me to think that this is what we are looking forward to in the year 2,000 in our place in this world. We can't really influence the rest of the world by looking at the simpler things. I think for some -- for some people, they might be able to use compost privies. Like what you really want to do is compost the waste. But to put it through all these pipes, miles away, and then to treat it with chemicals is the hard way to do it, when each family could do it individually. Even if the federal government and the state government pays large amounts of this, it's really us that's paying for it. Wouldn't we just as soon be in our yards working on a compost pile or a privy as it's

designed like they have been designed by the State Architect that's being accepted everywhere.

It's like I work in a compost, and it smells really good. It smells much better than a toilet that people have been urinating in because they don't want to waste the water to flush it.

And I don't think people really want to work at their jobs all that much longer to pay for this treatment plant that will be outmoded itself before long.

Well, it's -- I guess -- Do we have primary treatment now for most of the Peninsula and discharge to the outfalls?

CHAIRMAN WALKER: I'm not sure we are prepared --

MISS CHRISTEN: What kind of treatment do we have now?

CHAIRMAN WALKER: I would imagine it's all at least primary. But go ahead with your statement, and then we will come to it. Just tell us what you want us to hear.

MISS CHRISTEN: Well, I'm really glad to see the concern for the environmental impact, but I wouldn't -- for the alternatives, the best alternative to me sounds like 171, mostly because it is reused and -- and it's secondary treatment. I'm basically against tertiary treatment because it chlorinates the water and you don't have to look much further than your newspaper to see that chemical treatment and all kinds of treatment to water and the chemicals are being found all the time to cause cancer. And I think not to add more chemicals to our bodies and our water and our plants, and setting tables would be a good idea.

Well, I think that's all. Thank you very much.

CHAIRMAN WALKER: Thank you, Miss Christen.

I have now come to the end of the cards that I have before me of people who have registered and requested to speak. Is there anyone who had filled out a card marking "yes" that they intended to make a statement whom I have not called? I observe no one.

Is there anyone who has changed his mind and would now like to change his card and tell us what's on his mind? I observe no one.

MR. MEI: There is one.

CHAIRMAN WALKER: I see. Do we have your card, sir? Did you register?

MR. W. C. WOODWORTH: Yes. Woodworth is the name.

CHAIRMAN WALKER: Would you like to come to the microphone, Mr. Woodworth? I don't have your card.

Would you spell your name for the record?

MR. WOODWORTH: W-o-o-d-w-o-r-t-h, W. C.

I would like to speak as a private citizen, although I am very active in water matters on the Peninsula and a member of the Concerned Citizens for Water that meets every Tuesday morning at 7:00 o'clock for breakfast for two hours for the last six months, and we are trying to solve these water problems, and we are looking at these matters in the total.

I am a retired meteorologist and climatologist. I am much concerned about data bases and how things work in systems.

I would like to make one comment with regard to

Miss Christen. As a follow-up, the state has put out in a publication from the Office of Appropriate Technology -- I would like to read into the record -- There is a little pamphlet which I will leave with you called "Drying Up the Toilets." But this is the statement that they put out. The Chief Architect for the State of California is the primary author of these documents. He says:

> "Our sewage problems are a good reminder that it's usually easier to avoid problems than to correct them. Why do we dump our sewage into our drinking water to begin with and then have to figure out how to repurify the water at great effort and expense? Diluting our sewage 100 times with pure drinking water overloads our septic and leach systems. Central sewers compound the problem, bringing the sewage together with even more water from storm sewers and resulting in such vast volumes of water that expensive mechanical and chemical treatment is required. Yet that frequently doesn't work and much water remains wastedand polluted. Nutrients are not returned to the fields where they came from."

And this is basic to her talk tonight.

> "No amount of adding band-aids to a bad system can make it good. Particularly when a whole range of options has been developed. Compost toilets, vacuum-flush systems, holding tanks, and low-flush toilets that avoid the mixing of sewage with water are elements of new approaches to sewage, while often saving money in the process. Our sewage is a valuable resource, not 'waste'

to be disposed of, and that realization is bringing fundamental changes to our sewage management process."

I think this publication -- Incidentally, there is an office. It's called the OAT. It's a new office up in the State Capitol, and it's about six people, and they are putting out some fine publications. And one of the elements that's particularly good here is it shows a compost toilet and several bibliographies.

One of the things that's particularly pertinent here is the biological control of pollutants. And I see nothing in the study so far of the use of biological treatment of the sewage so it's put back into basically potable water. If you treat it through biological processes, you get it back for use three times. For $80 million you can do a lot of this type of stuff than what we are doing on the other.

I would like to leave you with this. I would like to make one other comment.

I have been involved in -- Since this is an EPA project, I think you should be concerned with what is the economic scenario that you were using in this 20-to-25 year time frame. There was a study put out for EPA called the Alternative Futures of Environmental Policy Planning, 1975 to the year 2,000. This was put out in 1975 by the Stanford Research Institute for the Environmental Protection Agency, Office of Pesticide Programs, Strategic Study Unit, Washington, D.C., Frederick Talcott, Project Officer. I have asked people locally if they cannot find and get a copy of this. I have an extra copy with certain materials in it. But it's very pertinent for the next 25 years. There are at least ten different scenarios that can be used economically to project growth patterns, the effect of the energy shortage, the effect of climate and the effect of food nationally. And I would like to see it projected on a regional and certainly a California basis.

We are trying to get some study made on this. This is an EPA study that's supposed to be made and processed by computers and updated. It was made in 1975. I think this ought to be considered similar in the processing of this particular feature.

In my military career, I have seen a lot of projects that were developed in the Arctic and some of the other areas. By the time some of these expensive projects got off and fully developed, they were useless, they were outmoded, and then you couldn't get rid of them.

You got to be very careful when you go into expensive projects they will be the thing that you want at the time they are finally determined. If it takes five to ten years to do it, you want to make sure it's right. I don't think the homework has been done on this particular study, evaluating these new technologies and such features as come out of our State Office of Appropriate Technology, I think it's very important to take another look at some of these aspects. And I suggest that the people that are concerned with this and the engineers relook at these documents.

CHAIRMAN WALKER: Thank you, Mr. Woodworth.

A copy of the article titled "Drying Up the Toilets," which is three pages, will be marked Exhibit 15 for purposes of this record.

(Whereupon Hearing Exhibit No. 15, three-page document entitled "Drying Up the Toilets," was incorporated into the record.)

CHAIRMAN WALKER: I have one more card here. The card that I now have, as near as I can read it, is Mr. Ferdinand S. Rutt.

MR. FERDINAND S. RUTT: Right.

My name is Ferdinand Rutt. I have been an on-and-off this Peninsula resident for 14 years. I'm a biologist, marine biologist in particular, working at present at the Catalina School. I'm very interested in conservation education and have been all my teaching career, 35 years.

And I would like to commend the association for this study, as Earl Moser already has. I think that it is a real step forward.

Particularly, in one way that has always disturbed me, and that is ocean fall discharge of sewage waste. I object to that strongly and always will as not a biologically sound system. I spend approximately a month a year in the field on the rocks along the Bay and seining the Bay and doing study of marine organisms. I have found a good deal of nitrate pollution on the shore. When you turn over a rock to find animals underneath it, you find this black sulfur dioxide material there embedded in the sand, which not being able to find any dead creatures in the neighborhood, such as a dead sea lion or something, I can only assume from observational

study and holding my nose that it's coming from the wastewater outfall of the Carmel sewage system which extends not too far out into the Bay.

A study of the Bay currents has been made by several people, reliable sources, that show that this water being dumped into the Bay is washing back onto the shore again. It is possible to produce charts to prove this. It is possible to reclaim wastewater for agriculture in a biological manner as is recommended by Mr. Woodworth. Studies on this matter have been conducted as late as 15 years ago at the University of Pennsylvania where a system of spraying the water onto the lands for use in tree farms, as well as agricultural purposes, was worked out at least 12 years back.

At the University of California at Berkeley, where I did a study for the National Aeronautics and Space Administration about ten years ago, I talked to Dr. Oswald and Dr. Golluch. They were working for NASA at that time trying to work out ways of reclaiming wastewater on space ships. You know, this is not too far off in the distant future when we are going to travel to other planets in our solar system with manned spacecraft, and something has to be done about reclaiming all the water on board because you can't add any more than you take with you except from the recycling waste on board.

At Dayton, Ohio, you will be amused and entertained to know that I drank some of that reclaimed wastewater, and it tasted just fine. In fact, you even have to add a little salt to it because it turns out to be distilled water, which brings up another interesting subject as to why we have a water shortage here on the Peninsula when the whole Pacific Ocean is sitting out there ready to be distilled. That's called evaporation techniques, and you get drinking water by recondensing it on silver plates and that sort of thing, and you get very pure water. In fact, this system is being used on a good many United States battleships today. If they can do it on battleships, which are small cities, we might even have to use it here. I think it's a major water supply.

Of course, that's another topic, and I apologize for bringing it up. It's nothing that bothers me very much. But why do we have a water shortage when we can reclaim sea water.

Now, if the Oswald and Golluch system for NASA, if you study it, you will find that it utilizes wastewater ponds. Wastewater ponds, according to their statistics, of five acres have a capability of clarifying sewage water for 20,000 people. I had hoped that the Carmel District would buy the Odella East property and, instead of dumping water on it to percolate into the ground, would have proposed building some ponds out there: five, ten, 15 acres in size on that 160 acre piece, use it as algae reclamation ponds. What Golluch and Oswald wanted to do was to put chlorella algae in the ponds which multiplies very rapidly, the same genus being studied by NASA. These algae break down the sewage materials, recycle it into usable foods for chickens, which can then be fed to foul for food. The water becomes pure enough to stock with bluegills, black bass, catfish and so forth, and you can then use those ponds for kid fishing. So you gain

recreation uses out of it, too. The water is purified by the algae and the fish and other plants can grow in the pond, and you can then use it for irrigation without the miscellaneous chemicals that are present in untreated wastewater.

I understand from a recent article in one of the newspapers that the State of Israel is using this system successfully. I suggest that the State of Israel and its progressive policies might be worthwhile studying by many people in many different ways, and I am not Jewish.

I feel that if we have to take one of the recommendations of the engineers, notwithstanding these types of studies which I have seen no record about, that I would have to favor No. 170 or 171 which recommend not putting the wastewater into the sea but, rather, reusing it in ponds. It doesn't mention using these 900 acre ponds for algae reclamation ponds, but I think that might be a very worthwhile alternative.

Thank you.

CHAIRMAN WALKER: Mr. Robert Greenwood?

MR. ROBERT GREENWOOD: I just wanted to ask Mr. Jerry Cole one question, if I might.

When he presented these alternatives, he said that Alternative 166 was the most cost-effective. And I notice that that costs $60 million and only reuses half the water, whereas Alternative 171 costs $53 million and reuses all the water. So I wondered if he could briefly tell us why that was not more cost-effective.

CHAIRMAN WALKER: Why don't you just tell us what you think. We are not prepared here to respond to detailed questions. If you disagree with him, tell us that and tell us why.

MR. GREENWOOD: Well, just from the facts that are presented here in the summary, it seems to me that 171 would be more cost-effective.

CHAIRMAN WALKER: Thank you, sir.

MISS CHRISTEN: I think it's that tertiary treatment is much more expensive than secondary treatment.

CHAIRMAN WALKER: I'm afraid you are not getting on the record.

You commented that tertiary treatment is more expensive than secondary?

MISS CHRISTEN: Yes.

CHAIRMAN WALKER: And you are Miss Christen?

MISS CHRISTEN: Yes.

CHAIRMAN WALKER: Thank you.

Is there anyone else who has not been called upon who had filled out a card asking to be called upon? I observe no one.

Evidently we have come to that time of the evening. I would like to announce that this is the first part of a two-part session. A session in Salinas tomorrow will be a continuation of this hearing. It is not a separate hearing. It will not be necessary to repeat on the record tomorrow what has been said tonight. It will be one continuous record. We will, of course, be very glad to hear any new information tomorrow night, and we are going to Salinas so that we will be available to the people of that community.

Very well, then, this meeting stands in recess until 7:30 tomorrow night in the Council Chambers at City Hall in Salinas.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
100 California Street
San Francisco, California 94111

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PUBLIC HEARING

on

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND ENVIRONMENTAL IMPACT REPORT, NORTH MONTEREY COUNTY FACILITIES PLAN

May 19, 1977

7:30 p. m.
Council Chambers
City Hall
200 Lincoln Avenue
Salinas, California

CHAIRMAN WALKER: Good evening. We will convene this session of the hearing.

My name is Matthew S. Walker, and I am designated as Hearing Officer for the Environmental Protection Agency, Region IX. This hearing is called to receive public comments on a Draft Environmental Impact Statement/Environmental Impact Report for the North Monterey County Facilities Plan.

With me this evening on my right is Mr. Anthony Mei, Environmental Engineer, who is the Project Officer for this project.

The National Environmental Policy Act of 1969, sometimes known as NEPA, requires that a detailed statement be made on the environmental impact and effects of any recommendation or report of any major federal action.

The Federal Water Pollution Control Act, the FWPCA, requires that the Administrator of the Environmental Protection Agency encourage waste treatment management that results in desirable impact effects to the extent possible on an area-wide basis.

The California Environmental Quality Act of 1970, sometimes known as CEQA, which is found in the California Public Resources Code, Section 21082 and following sections, resembles the National Environmental Policy Act and requires an environmental impact report when state and county or local agencies intend to undertake activity which may have a significant impact on the environment.

The purpose of this hearing is to meet the requirements of both the federal and the state action on the proposed project.

On November 1st, 1974, the Regional Administrator of the Environmental Protection Agency, Region IX, publicly announced the intention of the EPA to prepare an Environmental Impact Statement in compliance with Section 102 of the NEPA on the proposed agency action to make grants available for the construction of the North Monterey County Regional Water Pollution Control Facilities. A copy of that announcement last night at the meeting in Monterey was made a part of the record of these proceedings.

A notice of this public hearing was published on the 15th of April, 1977, in the "Monterey Peninsula Herald" and in the "Salinas Californian." The notice itself and affidavits of publication were also incorporated as exhibits in this hearing in the meeting last night in Monterey.

Notice was also published in the Federal Register on the 29th of April, 1977, and a copy of that notice was inserted in the record.

Copies of the Environmental Impact Statement and Report and the modification of the Environmental Impact Statement and Report were introduced into the record.

And copies of the mailing list to whom the copies of the report had been mailed were also made an official part of the record.

Letters have been received by us concerning this project, and these letters will be made a part of the record and will count just as much as though the writers of the letters were here and made their remarks orally.

A verbatim transcript is being made of this hearing, and it will ultimately be available for inspection in the Offices of the Environmental Protection Agency in San Francisco. It may be obtained and perused there. If you have personal need for a copy of that transcript, however, before it is available in the Regional Office, you must make independent arrangements with the court reporter, Mr. Tom Wilson.

Now, the record in these proceedings will be held open for further comments until the 20th of June, 1977. That is the close of business on the 20th of June. The comments must be received or delivered to the US Environmental Protection Agency, Attention: Hearing Office, and it will be helpful if you will mark it HE-135. That is a mail code for this series of hearings. It will probably get to the right desk if you put that code number on it. The Office of the EPA, Region IX, is at 100 California Street, San Francisco, California 94111. And that address was given in the public notice and in some of the material that has been circulated, both publicly and by handout.

Now, after the conclusion of this hearing, the record will be prepared; the transcript will be prepared. All of the comments that are received, either verbally or in writing, will be summarized and put together in a summary statement. The record itself and the summary of the comments will be carefully reviewed by a number of people in the Regional Office, and ultimately a decision will be made. The decision nominally is made by the Regional Administrator. He obviously depends heavily upon staff reports and reviews.

So all of this put together will ultimately become the agency decision.

The agency decision will then be incorporated in a final Environmental Impact Statement/Environmental Impact Report, which will be published several months from now.

We are prepared here to listen. We came to Salinas to hear what the public has to say. We have said, or the agency has put forth in the written documents, the agency's present thinking on the subject. And if you have questions about it, we are very glad to receive your questions, to make them a part of the record, to listen to them and to assimilate them. We may not be able to respond to all questions that are asked of us tonight. For one thing, we may not know. We are not necessarily the resource persons in the agency who have the answers to all of the questions. But we do want your questions.

Now, I will ask that persons who are addressing us tonight step up to the podium and use the microphone. We would like to have your name and, if you are appearing here in a representative capacity, we would like to know that as well.

If you have a written statement to present, it will be just as effective if you hand it in. It will then be made an exhibit and a part of the record. It is not necessary to read verbatim at length all written statements. We will pay just as much attention to it if you hand it in as if you stand there and read it. If you have a written statement and you do read it, we would also like to have it in hand so that we can have your words as you prepared them on paper.

Now, as to the procedures to be followed tonight, we will first hear from Mr. Dudley Lapham, who is the representative of the Monterey Peninsula Water Pollution Control Agency. After he has spoken and outlined the plan, Mr. Mei on my right from the Environmental Protection Agency, will have a statement to make. Then there will be a representative of Engineering Sciences, Inc., who will give a background of the Environmental Impact Report/Environmental Impact Statement.

Then we have a procedure for listening to all of the people who want to address us. We give precedence to elected officials. They will be heard first.

Thereafter, the other four groups of people will be categorized into these categories:

Unaffiliated private citizens.

Representatives of public agencies.

Representatives of special interest groups or associations, and

Representatives of business, commercial or industrial firms.

I will attempt to take one card from each of these groups in the order in which they registered and move around among the various categories so as to not give precedence to any one group. This may be difficult because, so far, I have received one request of people asking to be heard.

If you wish to speak to us, or even if you don't, we do appreciate it if you fill out one of these registration cards at the door. I believe most of you have. It is not, of course, required that you do so. This is a public meeting.

You may attend anonymously if you choose to do. It is helpful for us to know how many people attended and who attended and from where. We are looking for public input to the work of the agency, and it does assist us in knowing whom we are reaching and how well.

If you wish to speak, I do want to have one of these cards filled out. It will then be turned in to me by the young lady at the door, and we will call upon you.

Now, I will now call, then, upon Mr. Dudley Lapham.

MR. DUDLEY LAPHAM: Thank you, Mr. Walker.

Just in order to attempt to set the background for the kind of project and the participation of the local entities that have been involved, I have prepared the following statement and did present it as an exhibit at the first phase of the hearing last night. But if you will bear with me, I would like to read it -- It's very short -- to try to give you an indication of the screen against which the Environmental Impact Statement has been prepared.

The Cities of Monterey and Pacific Grove and the Seaside County Sanitation District, which is composed of Del Rey Oaks, Sand City and the major portion of the City of Seaside, are currently operating sewerage treatment plants for their respective jurisdictions. These are old systems. The plants were built in the early 1950's and have had some modification, but they do not comply with the current regional, state and federal wastewater standards. In the early 1970's, cease and desist orders were imposed. The entities responded with bond issues to fund improvements to meet the

then-current requirements and initiated a joint powers agreement, which is known currently as the Monterey Peninsula Water Pollution Control Agency, with all three of the entities as participants in February of 1972. The JPA was formed as the initial planning vehicle to secure an acceptable areawide solution to water pollution control for the five South Bay municipalities.

Also, in 1972 major amendments were enacted to the Federal Water Pollution Control Act, Public Law 92-500. The State Water Resources Control Board, through its Regional Water Quality Control Boards, was actively implementing the directives of the Porter-Cologne Act of January of 1970, which established statewide policy for control of water quality.

Further, in that period of time, there was major environmental legislation occurring in the late 1960's and in the early 1970's, primarily NEPA, CEQA and the Coastal Commission Act, which generated additional guidelines for pollution control operations. These supplemented the concerns of the State and County Health Departments in enforcement of provisions of the California Administrative Code.

In all this, locally our primary concerns were:

1. Requirements for rapid conversion to secondary level treatment.

2. The establishment by the State of a discharge prohibition zone drawn from Point Pinos to the mouth of the Salinas River.

3. The Fundamental mandate of 92-500 that "no pollutants" will be discharged to the waters of the United

States by 1985, and

4. Of course, the means of funding these mandated improvements.

In this latter respect, Public Law 92-500 authorized federal assumption of 75 percent of the cost of construction of municipal wastewater treatment works. Similar legislation, known as the Clean Water Bond Laws of 1970 and 1974, was promulgated by the state, permitting 12 and a half percent state participation. These federal and state grants are processed under the Clean Water Grant Program administered by the State Water Resources Control Board.

The MPWPCA, as our joint powers agency is known, was an early recipient of a planning phase grant under this program, with local share contributed on a self-imposed allotment system by the member entities.

With state approval, early plans were developed on the basis of the Tri-Cities concept of tieing the plants together with an ocean outfall at Point Pinos. Subsequent regional studies resulted in the Central Coastal Basin Water Quality Control Plan, May of 1974, which specified a consolidated wastewater management approach for the Monterey County communities bordering the Bay. The recommended plan for the Monterey Peninsula, Salinas and Castroville area municipal wastewater flows with construction of a regional treatment plant and outfall facility for discharge to Central Monterey Bay and/or reuse of reclaimed wastewater for crop irrigation and possible enhancement of the lower Salinas River water quality.

To comply with the Basin Plan, our agency abandoned its original plans and secured a facilities planning grant in conformance with the new approved concept. Monterey County and the City of Salinas joined the agency as full participants in the regional planning phase. Fort Ord and the Marina County Water District have served as ex-officio members. The regional facilities plan is nearing completion.

In accordance with the staging provisions of the Basin Plan, plans and specifications were developed for the Pacific Grove-Monterey Consolidation Project, which we refer to as Stage 1, and construction is starting this month.

The project we will discuss this evening will be funded by a 75 percent grant from EPA and a 12 and a half percent grant from the State Water Resources Control Board. The local share of approximately $14 to $15 million will come from the sale of sewer bonds which will be amortized by the District through a sewer service charge on all users. Please note particularly that any resident or commercial enterprise in the District not receiving service from the District will not be taxed or charged.

Large industrial users will not benefit from the federal and state grants. They will be charged a service charge which includes the grant portion to be returned to the federal government over a period of years.

The District does not intend to impose a tax on real property. All of its revenues will come from service charges. Taxes presently being assessed by municipalities or districts for sewer services will be reduced or eliminated when the District is fully operational.

I would like to emphasize that in the project planning process our agency studied every feasible alternative: a total of some 170 possible different solutions. We evaluated and compared them from economic, environmental and engineering standpoints. The five alternatives discussed in the draft Environmental Impact Statement were selected as those most likely to meet regulatory standards at the minimum cost over the life of the system and with the least disturbance to the local environment.

Mr. Walker, that concludes the formal statement which you received last night and I believe have assigned an exhibit number to.

CHAIRMAN WALKER: Yes, I have.

MR. LAPHAM: The agency, either at this time or perhaps at a later juncture in your hearing this evening, would like to introduce one more exhibit which comments upon the testimony which was provided to you from the Marina County Water District last evening.

CHAIRMAN WALKER: Thank you. We might as well make it an exhibit at this time.

MR. LAPHAM: Yes, sir.

If you recall, Mr. Walker, there was comment from the representative for Nolte Associates, who were the consulting engineers for the Marina County Water District --

CHAIRMAN WALKER: I recall.

MR. LAPHAM: -- at your hearing last evening --

CHAIRMAN WALKER: I do recall.

MR. LAPHAM: -- which were in the nature of rather significant questions, we felt, raised as to the project rather than necessarily as to the EIS. But since those questions have been raised, we felt that it would be appropriate for your official record to receive into it the comments which have been forthcoming from the Engineering Section of the State Water Resources Control Board in commenting upon the report which was submitted to you by Mr. Kahr for Nolte last night.

Rather than reading it in full, if I may paraphrase, and then I will give you, hand you a copy of the letter, a copy of which I received this morning.

CHAIRMAN WALKER: Please go ahead.

MR. LAPHAM: It comments upon the cost comparisons which Mr. Kahr was referring to last evening and indicates that, while the table that is contained in that report, a copy of which is an exhibit before you, is useful for decision making, federal regulations require that cost comparison be made on a present worth basis over a 20-year planning period with respect to total public dollars, including grant funds, and that, in addition, the cost comparisons should discuss the costs or savings to the regional project of the additional alternatives that have been considered.

As to the energy considerations which were contained in that original report, the comment from the State Water Resources Control Board Engineer indicates that a comparison of the energy requirements of the various alternatives will be required.

Then, further, if you recall, there was comment as to the Marina County Water District extending its own outfall, and the comment in this report is that the alternative of extending Marina's existing outfall outside of the discharge prohibition zone does not appear to warrant further investigation. The indication is given that such proposal would be opposed by the Regional Board and, further, that by their own analysis, the indication is that a use of a joint outfall would be more cost-effective.

With respect to Mr. Kahr's comment on the fodder irrigational alternative, the State Engineer comment is that without assessment of the impacts on the groundwater supply, this alternative would not be acceptable. The State Health Department, for example, opposed a plan proposed by Fort Ord two years ago to use spray irrigation for disposal due to adverse impacts on groundwater resources.

Again, without reading entirely, the indication is given that the remaining alternatives appear to be either excessively expensive, difficult to implement and manage and/or have potential adverse impacts, and recommends that the plan be studied by our agency as well as by the regional board and that their involvement will be mandatory prior to any State Water Resources Control Board decision on the proposals.

The comments on the Nolte Engineering report, which was introduced, were submitted by Mr. James L. Waters, Engineer for the State Water Resources Control Board, and I would like to introduce that into evidence for your further utilization.

CHAIRMAN WALKER: Thank you. Would you hand it to Mr. Wilson right beside you, and he can keep it for us, and it will be marked in its turn Exhibit 16.

MR. LAPHAM: Thank you, sir.

(Whereupon Hearing Exhibit No. 16, two-page letter to Mr. Charles S. Kahr from James L. Waters, May 17, 1977, was incorporated into the record.)

CHAIRMAN WALKER: Mr. Mei?

MR. ANTHONY MEI: Thank you, Mr. Walker.

Good evening, ladies and gentlemen. As you have heard, my name is Anthony Mei, and I want to thank you for coming tonight to this hearing. Your participation in this hearing is valuable and vital to the Environmental Impact Statement process. This Environmental Impact Statement was prepared to inform you about what the impacts of the project are expected to be. That is, the environmental, social, and economic impacts. The primary reason for this hearing, though, is to hear your feelings, your ideas and your comments on the Monterey Regional Wastewater Project.

As Mr. Walker noted earlier, this hearing is being conducted to fulfill the requirements of several state and federal laws. This hearing is also a step in the procedure for obtaining grant assistance from the federal and state governments for the construction of water pollution control facilities. Ideally, after these hearings are closed and all comments are responded to, the Environmental Impact Statement will be completed. At that time a decision will be made whether or not grant monies will be made for design and, subsequently, construction of the proposed facilities.

I would like to summarize the Environmental Impact Statement for you. I will briefly cover the purpose of the project, the alternatives that were evaluated and the major impacts of the project.

This project is designed to improve water quality by improving wastewater treatment service to residents in the Southern Monterey Bay/Lower Salinas Valley Region of Monterey County. The major objective of the project is to eliminate public health hazards and water quality problems being caused by existing wastewater discharges to Monterey Bay and the Salinas River, which also impact Tembladero Slough and Elkhorn Slough. The project also seeks to reuse treated wastewater for irrigation of crops in the Castroville area to reduce overdrafting of the groundwater table, and to assist in curtailing salt water intrusion in the Lower Salinas River Valley. Landscape irrigation on the Monterey Bay Peninsula has also been considered subsequent to the issuance of this draft Environmental Impact Statement.

Mr. Jerry Cole of Engineering Sciences, Inc., will elaborate on the specific alternatives after this presentation. Basically, though, a regional treatment plant north of Marina is proposed. This will ultimately entail abandoning eight local treatment plants and connecting them with interceptor pipelines to the regional plant. Several levels of treatment have been considered, and four methods of disposal are suggested, each having irrigation reuse as a further option. The two most feasible methods of disposal are an outfall

discharging to Central Monterey Bay and an outfall discharging to the Lower Salinas River. Both discharges would occur during the nongrowing season when irrigation reuse is impracticable.

The beneficial impacts of this project are the elimination of public health hazards in the Bay and river, the improvement of water quality and the reuse of a valuable resource for agricultural irrigation.

The adverse impacts of this project include the traditional primary construction impacts and several significant secondary impacts, that is, the indirect impacts. The construction impacts are temporary and include traffic, residential and commercial disruption; creation of noise and dust; and the elimination of grassland and grazing areas north of Marina.

The secondary impacts are directly related to the population growth accommodated by the capacity of the proposed facilities. The additional 98,000 people by 1995 will have the following impacts:

1. Increased demand on the already limited potable water supply source.

2. Increased air quality problems in the area, and

3. Loss of time and unique agricultural land to development.

It should be noted that, in all alternatives considered, except one, all discharges to the Salinas River will be removed. The impact of this is double-edged. That is, it may be beneficial, yet adverse at the same time.

The reclamation option, that is, the irrigation reuse, is currently an unresolved issue. A five-year-long demonstration project is currently underway to determine the effects of using reclaimed water on produce crops.

I would like to point out that the population and air quality addendum which was mentioned in the errata sheet in the Draft Environmental Impact Statement was mailed approximately ten days ago. In conclusion, this project is associated with significant environmental impacts and issues concerning water quality, air quality, agriculture and public health. Your input is essential to this process. Therefore, this hearing is being conducted for your benefit. This is your opportunity to comment on a proposed project which impacts the region in which you live.

Thank you.

CHAIRMAN WALKER: Thank you, Mr. Mei.

Mr. Jerry Cole?

MR. JERRY COLE: My name is Jerry Cole. I'm with the consulting engineering firm of Engineering Science.

I would like to clarify our position in the entire project in that we were retained by the agency in the Fall of 1975 -- Excuse me -- '74 to prepare a facilities plan for the project. This is in conformance with Section 201 of the Federal Water Pollution Control Act.

The draft report was completed in July, entitled "Facilities Plan for North Monterey County Draft Facilities Plan Report," and has been available for review.

The agency retained a separate, independent environmental consultant who prepared the Draft Environmental Impact Statement, which is really the subject matter for this hearing, and the consultant performed an independent environmental review of the alternatives that were developed by us.

Could I have the first slide, please?

(Slide No. 1.)

This slide shows the study area, which is basically Northern Monterey County, consisting of about 300 square miles. The City of Salinas, the Castroville area and the Monterey Peninsula area. You see the study area boundary here by a solid-and-dashed line. There are seven publicly owned treatment plants in the area and one, a federal installation, Fort Ord Military Reservation. Our task was to develop wastewater management alternatives which would comply with the various regulations that have been described to you earlier by Mr. Lapham.

With eight treatment plants and a number of discharge options, namely to the ocean, to the Salinas River or to the lands, there are literally thousands of alternatives that are available. However, recognizing a number of constraints, we developed 175 initially. These were screened both by ourselves and by the agency's environmental consultant, and also with the assistance of the regulatory funding agencies as well as the Technical Advisory Committee to the agency, which was composed of technical staff persons from all the various public entities in the planning area. The alternatives were screened down to 45. Forty-five alternatives were costed, and engineering cost estimates were prepared for these alternatives, and they were further screened by the environmental consultant. Five alternatives appeared to have a high degree of implementability and cost-effectiveness associated with them, and they were selected for detailed evaluation.

And I have slides of each of those that I would like to show you now.

(Slide No. 2.)

First in the group of five is known as regional ocean disposal, which would combine all the treatment at a central regional plant near the mouth of the Salinas River with ocean disposal. The treatment plant would be secondary-level treatment, meeting the federal requirements for ocean disposal.

Both capital cost, operational cost and present worth cost were developed for each one of these alternatives. Total present worth of this alternative was $55.6 million.

(Slide No. 3.)

The next alternative was regional irrigation and river disposal. Once again, all the treatment plants would be abandoned and consolidated at a new regional treatment plant near the mouth of the Salinas River with tertiary treatment. Wastewater would be used for irrigation of crops in the Lower Salinas Valley. It is proposed to tie in with the proposed Castroville irrigation project. During periods of time in the Winter when there were -- when the demand for irrigation water is very low, the wastewater would be discharged to the Lower Salinas River.

This alternative had a present worth cost of $73.4 million.

(Slide No. 4.)

The next alternative getting detailed analysis was regional irrigation with ocean disposal. Once again, treatment would be consolidated at a regional plant in the mouth of the Salinas River. The plant would be tertiary level, supplying reclaimed water to the Castroville irrigation project during the irrigation season, with ocean disposal in the Winter when irrigation was very low.

This alternative had a total present worth cost of $60.1 million.

These present worth dollars are expressed in 1975 dollars, which is when we completed the analysis.

The next slide, please.

(Slide No. 5.)

The next alternative involved treating wastewater at a regional plant near the mouth of the Salinas River, tertiary level, storing the wastewater and tieing into the Castroville irrigation project. In effect, a hundred percent of the wastewater would be used for irrigation purposes, so the Winter flow period would be stored for use during the Summertime.

The yellow line on this chart represents the Castroville irrigation pipeline project.

It has a present worth cost of $71.2 million.

Next slide, please.

(Slide No. 6.)

This alternative is an offshoot of a study that was conducted by the US Army Corps of Engineers' urban systems study in 1975 in the Monterey County area. The charge of that study was to evaluate land disposal of wastewater. This system includes a regional treatment plant near the mouth of the Salinas River, percolating the wastewater, treated effluent, into the groundwater and then repumping the water out and tieing into the Castroville irrigation project. In effect, this would be, then, an underground storage reservoir contrasted to a surface water storage reservoir, which was the previous alternative.

The present worth cost of this system was $53.5 million.

May I have the next slide, please?

(Slide No. 7.)

The system selected and recommended by our firm as being the most cost-effective -- And when I say "cost-effective," I mean not only monetary costs, but other social and environmental costs -- was one in which there would be a regional consolidation near the mouth of the Salinas River, the treatment plant tieing into the Castroville irrigation project in the Summertime for crop irrigation and ocean disposal in the Wintertime when the demand for irrigation water was low.

This red line shows various interceptor sewers, and the yellow area is the projected ultimate regional sewerage area. The green represents Zones 2 and 2A of the Monterey County Flood Control and Water Conservation District, which is a service area for the Castroville irrigation project. It's

proposed to build this project in stages, and with the treatment plant and the outfall to be built first, and as both Mr. Mei and, I believe, Mr. Lapham alluded that there is in the planning stages a five-year demonstration project to evaluate whether it is feasible to use the treated wastewater for crop irrigation in the Lower Salinas Valley.

That concludes my remarks.

CHAIRMAN WALKER: Thank you very much.

Now we have come to the public part of the meeting, and the first card that I have is Mr. Jim Conner.

MR. JIM CONNER: My name is Jim Conner, and I am a resident here in Monterey County.

I am here to oppose any discharge into the Bay, whether it be secondary or tertiary. I'm here to state that the reasons being would be the salt water intrusion problem we have in the Castroville area and the arresting of that problem, which could come from a tertiary or a secondary treatment facility with irrigation possibilities in the Castroville area or pumping in the groundwater for storage. This could alleviate the inversion. It would have to take approximately maybe ten-fifteen years before we could actually see if any of these effects were longstanding.

Also, last evening in Monterey, Mr. Kahr -- I believe he was with the Nolte and Associates, engineers for Marina's Sewage Treatment District -- wanted to state that they had a petition signed by 700 people approximately out of 8,000 that were opposed to joining this regional sewage treatment plant. There is an old saying that too many cooks spoil the broth.

We can see that with the eight sewage plants that we have in this area at the present time. We need to put a region -- put a regional plant into effect. Tertiary is a little bit scary on my part. I'm not too sure of chlorination and that, but we have to take the chance.

In our Environmental Impact Statement, the intrusion shows that in nineteen-seventy -- Let's see -- by 1980 approximately 10,700 acres will be -- will be affected at the 180-foot water aquifer.

I'm sorry. I just received this today, and I have been reading it all day, so I'm kind of blinded. I don't want to sound like a neophyte, but I guess that's what I am in public speaking.

I would like to quote from a book, "Population Resources Environment," from Erlich and Erlich, 1970. Erlich and Erlich. Paul Erlich is at Stanford University.

I'm here mainly for the river, the Salinas River and its inhabitants, the animal inhabitants.

He states that:

> "Water pollution with sewage provides one of your classic examples of diseconomies of scale accompanying population growth. In a few people per mile -- If a few people per mile live along a large river, their sewage may be dumped directly into the river and natural purification will occur. Should the population along the river increase further and more and more elaborate and expensive treatments -- then more and more elaborate treatment will be required to keep the water safe for

> human use and to maintain desirable fishes and shellfish in the river. In general, the more people there are living in the watershed, the higher per capita costs accordingly will cost with water purification."

CHAIRMAN WALKER: Would you give us the reference? You have given us the title. If you could give us the page number so we can refer to it.

MR. CONNOR: The page number is 135, Paragraph 3.

CHAIRMAN WALKER: Thank you.

MR. CONNOR: Thank you.

CHAIRMAN WALKER: Thank you, Mr. Connor.

The next card that I have is Mr. J. C. Lyons.

MR. J. C. LYONS: Thank you.

My name is Jody Lyons. I came here as a private citizen because I ran into a book called "Clean Water, Nature's Way to Stop Pollution." It's by Dr. Leonard Stevens. He came up with some very interesting ideas on using irrigation water, reuse of irrigation water from plants.

Pardon me if I sound a little shaky. I'm nervous as could be. I'm just not used to standing in front of a bunch of people and talking.

CHAIRMAN WALKER: Well, just talk to us. We are only two up here.

MR. LYONS: Thank you.

There was in this paper the statement put out --

CHAIRMAN WALKER: Yes, sir. We have that as an exhibit in our record.

MR. LYONS: I have a question as to the use, possible misuse, of the water as irrigation water and affecting the water quality of the top aquifer. Dr. Stevens mentions that Seabrook Farms in Southern New Jersey just after the end of the Second World War, found that they had a tremendous problem with the same thing. They were dumping pollutants into a nearby creek and were getting into trouble for it. They took the land use alternative, and over a period of years, discovered that the water quality, which did not meet -- from the aquifer, which did not meet the state standards for potable water, came up to standards and surpassed them with the water going through the biological filter, essentially through farming.

And I would like to come out in support of the use of irrigation alternatives. I do have a question, though. How is this to be conveyed? It mentions in the two alternatives that I like, Alternative 170 and 171, that the water will be conveyed from this tertiary treatment plant to Castroville for use. Who's going to pay for it? Will the people who benefit from the fertilizer value of the effluent pay for it? Will it come from all of the taxpayers in Monterey County? What will the conveyance form be? Will it be a pipe main going out to a centralized system?

In one place in Indiana, they were taking the effluent out in tank cars out of the big cities and putting it into a lagoon and then it was piped from the lagoon to the fields. That might even be a possibility here. We do have the trucks already available.

I would like to find out more about this, and I was

wondering how can I get more information after this set of hearings is done and implementation is taking place?

MR. MEI: Why don't you speak with me during the break, and I will give you my name and address and phone number. You can contact me and I can give you further information on that.

MR. LYONS: Great. Thank you.

MR. MEI: You are welcome.

CHAIRMAN WALKER: Thank you, Mr. Lyons.

Mr. Paul Till?

MR. PAUL TILL: Yes.

Can I have the first slide?

(Slide No. 1 - Mr. Cole's presentation.)

My name is Paul Till, citizen of Monterey.

This system apparently depends upon these plants in Monterey now being consolidated. Well, apparently there is some opposition to the funding now going on, and the people are trying to bring it to a referendum in Monterey, to a vote of whether or not they are going to pay the tax which the state wants to mandate down to them. If that is not -- If it does go to referendum and if the funding is voted down, then you are going to have a problem constructing the rest of the line out here since it depends on the 48-inch pipeline, I believe. Is that correct, Mr. Lapham?

CHAIRMAN WALKER: Why don't you just make your statement. We are not prepared for a colloquy here.

MR. TILL: Okay.

CHAIRMAN WALKER: Just go ahead and tell us what you think.

MR. TILL: Okay. Well, I think this problem is -- there might be a problem with funding if the voters in the Monterey/Sand City/Del Rey Oaks and Seaside area vote not to pay that new tax.

That's basically it.

CHAIRMAN WALKER: Yes, sir. I think that's a point that will be addressed in the final statement.

I have no further cards before me of people who wish to speak. Is there anyone who has filled out one of these cards and checked he did wish to speak and I have not called on him? I see a hand over there. Did you fill out a card, sir?

MR. WALTER WONG: Yes, I did.

CHAIRMAN WALKER: Thank you. We will find your card later, but tell us your name now.

MR. WONG: Walter Wong, Director of Environmental Health, Monterey County.

I had not intended to speak since we had a written statement, but I thought it would be best in the public interest particularly in the area of actual wastewater reclamation discussed on Page 228.

It might also be recognized that being the Environmental Health Officer, our major concern is public health, and it was my action eight years ago of closing all of the beaches in the Monterey Peninsula from Seaside, Monterey, Pacific Grove, Pebble Beach, Carmel, Salinas River. We had disseminated all these actions for cleaning up the river. So you can see that I am concerned about cleaning the pollution of

our ocean and river.

But I also am concerned on the public health aspects of reuse of wastewater and the statement indicating here that the use of reclaimed water meets State Health Department requirements and has no consideration of any health problem is a word that I would like to have amended because we feel, particularly here locally with such a large agricultural area, that there are many public health questions that have not been answered and there is a definite need for this five-year demonstration project to answer these questions because the impact will not only be here locally, but statewide and nationally because no one has used reclaimed wastewater on such food crops as lettuce and others that are eaten raw.

So, therefore, that the questions of virus on absorption by crops on the soil and its exposure to farm workers, reentry time into the field and the chemicals and heavy metals that could be possibly absorbed by the product and exposure again to the farm worker should be answered and many other aspects of groundwater contamination, and I feel that until these questions are answered, which we have researched and asked the engineering firm of Engineering Sciences Research, and no such work has been done anywhere other than this proposed demonstration project.

And I would recommend that the Hearing Officer amend it so that the reclaimed -- use of reclaimed water on agricultural food crops, particularly such as those eaten raw, be considered only after the demonstration project is completed.

CHAIRMAN WALKER: Thank you, sir.

Is there anyone else who has filled out a card and wishes to speak or has filled out a card and has changed his mind?

MISS GAIL CHRISTEN: I checked "no," but I would like to speak.

CHAIRMAN WALKER: Would you come to the podium and tell us your name so we can find your card?

MISS CHRISTEN: I'm Gail Christen.

CHAIRMAN WALKER: Gail Christen.

MISS CHRISTEN: Hi. I'm a citizen of Monterey County, and I would like to express my feelings about the wastewater treatment.

And, first of all, I'm against the outfalls, too, because like people are just clustering to the coast all over the world and the population is growing and we can't have everybody in the world putting their excrement into the water because it comes back. And the currents just bring the water along the coasts.

Water should be clear. If you are out a little ways into the ocean, you can see it this big, 50 feet down and more. But people, I trust, in the sciences are convinced that it's because of the sewage discharge that our water is very muddy and often our beaches smell bad.

And, for instance, San Francisco puts -- is filling up their Bay with sludge and that solid waste, and they put billions of gallons a day into their outfalls. So it comes this way. California current brings it here.

So, you know, I think this would be a good place to start considering some other alternatives. See, as long as we excrete into our rivers, we are going to just pollute ourselves, and that's exactly what we are doing because excrement should go straight into the land immediately so that it can start its return to the plants and all that we live on. It's not really that bad it has to be flushed away with gallons of water and shipped many miles and treated with chemicals. We don't have to if we didn't shit in our water. Excuse me. But then we could use fresh clean water to water our vegetables.

Now, I know that, you know, we can't suddenly turn all the toilets into goldfish bowls, especially in apartments and things like that, but there is lots of -- you know, it's relatively new. Toilets are relatively new. And for a million years, people have done pretty well without them. And I think it's a mistake.

There are some systems of dry toilets that are mentioned in the record. They were mentioned at last night's meeting in Monterey, and the State Architect has information on it, compost privies, chemical treatment toilets. There is propane-burning systems. If we really are going to put this much money and effort into a plant to have so many drawbacks environmentally and in terms of preparation for the coming century and the many new people, I think that we should put a great deal of consideration and a substantial sum into the study of alternatives because this is an outmoded way of doing -- of getting rid of our wastes, which shouldn't really be waste at all because it has a use and it fertilizes our soil. It's just --

Well, also I would like to express my feelings about tertiary treatment. I'm totally against more chemicals into the water. I don't think we have to take that gamble to gamble lives. And the land, loss of prime agricultural land, even with -- even with the percolation systems and things like that, which is better to reuse the -- it's better to reuse the wastewater than just to put it in an outfall. But the waste of a lot of land when it can't be used like for recreational purposes or by the people is kind of frightening in terms of what are we going to do in 2000 or so when this is an outmoded system and then there is less people and land is needed more, and we need a bigger system.

Thank you very much.

CHAIRMAN WALKER: Thank you, Miss Christen.

MISS CHRISTEN: Thank you.

CHAIRMAN WALKER: Is there anyone else? Yes, sir? Do we have a card for you?

MR. WARREN HURST: Yes. I put "no," but I would like to make a statement, if I may.

CHAIRMAN WALKER: You are Mr. Weaver?

MR. HURST: Warren Hurst.

CHAIRMAN WALKER: Thank you, Mr. Hurst.

MR. HURST: I'm a resident of River Road. I essentially live at the lower end of the charts that you saw, and I am concerned with many things.

And, first, I would like to say I appreciate the solemnity of the occasion, Mr. Walker, because of the

irreversibility of any decisions that are made. It's not easy to make that decision.

First, I am concerned about the outfall. I don't think we have enough information, of course, presented here and it would be practically impossible without a 12-week seminar to present all the data that's in the statement. I would like to know -- and I don't know if you can give me an answer here or not -- what is the mechanism of the outfall? Where is it actually going to be discharged? Specifically, is it going to be on the Bay floor, local and within maybe a hundred fathoms, or are we talking about discharging it out into the Monterey Canyon? Where is that water going to go?

Also, is there sufficient circulation by the various currents to dissipate any of the water that does go out there?

Can we take advantage of any foreign studies that have been made in these various areas? I'm thinking particularly of Korea and Japan. And on this particular point, I must disagree with the young lady about the direct use of discharges on the land. It doesn't smell too good.

MISS CHRISTEN: I mean composted immediately, individual use.

MR. HURST: Thank you.

And since I live upstream, I think, from the project and we are -- my locality, we are on a community well which is now into the 400-foot aquifer, and we are sitting by the roadside, so to speak, as all of the effluent from, I presume, King City and Greenfield and Gonzales floats by, sometimes it doesn't float by; it stops. Is there a reason why the upstream communities were not included in this report if, in fact, their effluent does reach Salinas?

You mentioned the Castroville irrigation project. Is it in being? Is anything physically being done now that can be,. let's say, exposed to the public, or is it a very controlled thing that is not open to, say, discussion at the moment? Is it a large area? Is it a 50-foot plot of ground somewhere? What is the elements of that particular project?

That's enough for now. Thank you.

CHAIRMAN WALKER: Thank you, Mr. Hurst. Your questions will be addressed in the final report unless there is someone here that wants to respond.

MR. COLE: I could elaborate slightly on the outfall if you would like.

CHAIRMAN WALKER: All right. Mr. Cole?

MR. COLE: Let me just expand my remarks slightly on the outfall.

The outfall is a result of -- The outfall design is a result of about a quarter of a million dollars worth of oceanographic studies conducted over a period of at least longer than a year. It took us time to get the type of current metering system that would function reliably. So I think we can -- do have some data prior to our full year's continuous current monitoring. But we had two current, continuously monitoring current meter stations located in general over the Salinas River mouth just south of the canyon. And we went out bimonthly and took water quality analyses. We took the data, analyzed the data, presented the information

in a supplementary report on the outfall design. This report was revised by the Marine and Estuarine Technical Committe of the State Water Resources Control Board, which I believe their representatives are here tonight from the State Board, and correct me. I think it's headed up by Scripps Institute and others down in San Diego.

The outfall as proposed is approximately 7,200 feet; the discharge at about 85 to 95 feet of water and is, in general, about three-quarters of a mile south of the Salinas River. And it will be laid on the bottom in the surf zone. It will be buried, and the pipe will be exposed, I won't say beyond about the 40-foot contour. It's designed to achieve a hundred-to-one initial dilution at least 50 percent of the time.

That, I hope, gives you a little bit more background on the outfall.

CHAIRMAN WALKER: Thank you, Mr. Cole.

MR. COLE: Let me just amplify that just slightly.

There is another study being conducted by us in the discharge zone, proposed discharge zone, called an environmental baseline study. For at least a year's period, we will be gathering environmental background data. They are assisted very heavily by the oceanographers and staff of Moss Landing Marine Institute, very competent in this field, marine biologists as well as physical oceanographers. And we prepare quarterly reports on our findings. These reports are available for public scrutiny, of course, and this information will be used if and when an outfall is built. And then as a means of comparison after the outfall is in operation there will be a detailed monitoring program conducted probably quarterly. And the results of that program would be compared with this environmental baseline study to determine if any detrimental environmental effects are occurring.

And that study was commenced in, I believe it was, February and it will continue for the following years.

CHAIRMAN WALKER: Thank you, sir.

Mr. Everett Weaver?

MR. EVERETT WEAVER: I really don't need to go up there for the mike. I have got a loud voice.

CHAIRMAN WALKER: Please come to the microphone. It's a little easier for us to handle the record and the proceedings.

MR. WEAVER: I have used sewage sludge for 35 years, and the thing -- I have two problems.

One is where are the boundaries of this system liable to be? I live in San Rancho. Is it going to affect that? Not that I feel bad about that; I just am curious. Is there any boundaries established?

CHAIRMAN WALKER: I'm not quite sure I understand your question. Boundaries for what?

MR. WEAVER: Where compulsory connection to the sewer system will be required?

CHAIRMAN WALKER: That, I think, is shown in the exhibit and graphically in a map form.

MR. WEAVER: Well, they are not defined as to metes and bounds or any way that I could correlate to my particular

address, for instance. I can get an answer for that.

The other thing is I am a little disturbed about this continual researching things that have been researched the world over and that the City of Milwaukee puts out a sewage sludge product called Mill Organite, and have for 40 years that I know of, and they have tremendous amounts of data, and there is a lot of other areas with all kinds of data, and I don't see it used.

And I particularly was disturbed to find that I was precluded from the use of sewage sludge in my flowers at home because your local doctor issued an order that no sewage sludge could be used anymore when I have used it for, like I say, 35 years.

I think that's all I have to say.

CHAIRMAN WALKER: Thank you.

I have no more cards before me. Is there anyone else who has handed in a card and wants to talk? Someone I have missed? Someone who has changed his mind? I see no one approaching.

Very well, then, it appears that we have come to that time. As stated earlier, the record will be prepared. The transcript will be prepared. All of the remarks will be reviewed and summarized. All of the written material that has been handed in that was prepared for this series of hearings will be studied, and ultimately a decision will be made and a final Environmental Impact Statement/Environmental Impact Report will be published.

The record will be kept open until the 20th of June, 1977, the close of business on that day. And we would like to have material either received or delivered at the Offices of the Environmental Protection Agency, Region IX, 100 California Street, San Francisco 94111. If you will mark on the transmittal that this is intended for Hearing HE-135, it will assist us in having the material get to the right file, the right place and the right desk.

With that, we will conclude this part of these sessions, and I thank you very much for your attendance and courtesy and for all of the remarks that we have received tonight. We appreciate it.

---oOo---

STATE OF CALIFORNIA)
o ss.
County of Monterey)

I, THOMAS R. WILSON, hereby certify that the proceedings in the Public Hearing held on the Draft Environmental Impact Statement and Environmental Impact Report, North Monterey County Facilities Plan, at the Monterey Public Library, 625 Pacific Street, Monterey, California, on May 18, 1977, and at Council Chambers, City Hall, 200 Lincoln Avenue, Salinas, California, on May 19, 1977, were taken down in shorthand by me, a Certified Shorthand Reporter and a disinterested person, at the times and places therein stated, and that the proceedings were thereafter reduced to typewriting under my supervision and direction.

I further certify that I am not of counsel or attorney for either or any of the parties to the said proceedings, nor in any way interested in the event of this cause, and that I am not related to any of the parties thereto.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal of office this 23rd day of May, 1977.

OFFICIAL SEAL
THOMAS R. WILSON
My Commission Expires February 29, 1978

Thomas R. Wilson
NOTARY PUBLIC in and for the
City and County of San Francisco,
State of California

WRITTEN COMMENTS ON THE DRAFT EIS/EIR

The following pages contain copies of all written comments received on the Draft EIS/EIR. The questions and concerns expressed in the letters are answered in the Response to Comments on the Draft EIS/EIR section that appears later in the report. A matrix in the front of the Responses section indicates the topic(s) under which each letter's questions are considered. Each of the following pages contains two pages of letter; they follow in sequence from left to right.

(HE-135) 12

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20310

REPLY TO ATTENTION OF DAEN-ZC

26 MAY 1977

Mr. Paul DeFalco, Jr.
Regional Administrator
US Environmental Protection Agency
Region IX
100 California Street
San Francisco, CA 94111

Dear Mr. DeFalco:

On behalf of the Department of Defense we reviewed your draft Environmental Impact Statement (EIS) concerning the North Monterey County Facilities Plan.

We note that the proposed project would impact on the Army's Defense Language Institute, (DLI), Ft Ord and the Navy Post Graduate School (PGS) at Monterey. However, since both the DLI and the PGS use local public utilities they should not suffer any significant adverse impact from the proposed project.

We do have a significant problem at Ft Ord, however. As noted on page 25 of the EIS, the Army had planned to provide land treatment facilities as an extension of our secondary sewage treatment plant at Ft Ord. These facilities were planned to eliminate any discharge across the beach at our installation and were in accordance with your NPDES permit. Our project was justified to Congress on the basis that the regional system would not come into existence prior to 1985 and that the system would require those using it to provide their own facilities for secondary treatment.

The EIS indicates that the regional concept has been revised to include complete treatment of the sewage from all users. In addition, it is indicated that the system could come on line as early as 1982. When complete the system would cause the Army's existing sewage treatment facilities and any extensions to them that we might build to become obsolete. We recognize that such a change in concept will substantially increase the users' investment in the construction of the system as well as the annual service charges. This change in concept has caused us to reevaluate our own proposed actions. As a result, we can no longer justify construction of our own land treatment facilities at Ft Ord unless we determine to operate our own sewage treatment facilities for the long term without joining the regional system.

DAEN-ZC
Mr. Paul DeFalco, Jr.

The EIS should be revised to indicate our concern and the option we might have to select.

In addition to the above, it is suggested that the EIS be revised on page 39 and other sections which discuss military strength and family housing units. A proposed revision to page 39 is as follows:

> "Military... and 350 units of residential housing ~~will soon-be-added~~ are under construction ~~at the rate of 350 units a year, with a final total of 1,000 new units~~ and a base population ~~not exceeding~~ approximating 25,000 ~~by 1995~~. No other units are currently authorized. However, the Army recognizes the need for approximately 2,000 additional units. Some portion of this need could be constructed on-post with the remaining being provided by the civilian community. ..."

We appreciate the opportunity to comment on your EIS and trust that our comments will be of assistance to you.

Sincerely,

Albert C. Costanzo
ALBERT C. COSTANZO
Colonel, CE
Deputy Assistant Chief of Engineers

(HE-135) 8

VED
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3 77

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105

SPNED-EA

18 May 1977

Mr. Paul De Falco
Director, EPA, Region IX
ATTN: Hearing Office
100 California Street
San Francisco, CA 94111

Dear Mr. De Falco:

Reference is made to your notice of 8 April 1977, requesting review of the Draft EIS/EIR for the North Monterey County Wastewater Facilities Plan.

It appears that certain aspects of the proposed activity will fall under Corps of Engineers jurisdiction and will require authorization for structures or work in navigable waters of the United States and/or authorization under Section 404 of the Federal Water Pollution Control Act Amendments of 1972. If you require additional information on this matter, please contact our Regulatory Functions Branch at (415) 556-5966. Also, please note attached letter which is a copy of a 5 November 1976 letter from Mr. James Wolfe of the San Francisco District to Engineering-Science, Inc., (copy to the Monterey Peninsula Water Pollution Control Agency) indicating that the Corps disclaims jurisdiction over a portion of the subject activity.

Because the subject document is essentially a plan rather than an environmental document for a specific construction project, this office has not carried out a detailed review. It is noted, however, that information provided on pages 42 and 257 concerning flood hazard mapping requirements may not be entirely accurate. Clarification of this information can be obtained by contracting the Federal Insurance Administration.

Thank you for the opportunity to review your report.

Sincerely yours,

H. E. Pape, Jr

H. E. PAPE, JR
Chief, Engineering Division

1 Incl
As stated

Copy Furnished:
Monterey Peninsula Water Pollution Control Agency,
w/cy Incl

5/26/77 [illegible] L.P.

SPNCO-RF
No. 11294-25

5 NOV 1976

Mr. T. G. Cole
Engineering-Science, Inc.
600 Bancroft Way
Berkeley, CA 94710

Dear Mr. Cole:

This is in response to your letters, dated 24 September 1976 (with inclosed prints) and 13 August 1976, regarding the proposed construction of Phase I of the Pacific Grove to Monterey Interceptor of the Monterey Peninsula Water Pollution Control Agency Regional Sewerage System, in Monterey County, California.

We have reviewed your set of prints of Sheets P-0.01 through P-0.06, inclusive, all dated June 1976.

The information you submitted is sufficient to administratively determine that the proposed activity will not involve the discharge of dredged or fill material into a navigable waterway or an adjacent or contiguous wetland pursuant to Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500; 86 Stat. 816), and will be conducted above the former shoreline reached by the mean of the higher high waters pursuant to Section 10 of the River and Harbor Act approved 3 March 1899 (33 U.S.C. 403; 30 Stat. 1151). Therefore, at the present time, a Department of the Army permit will not be required for the work as shown.

However, we request that you notify this office when your construction is scheduled to start, as the work may be interpreted as an unauthorized activity by concerned members of the public. We also ask that you notify us upon completion of your project so as to enable our inspection to determine that no work was performed in our jurisdiction without proper authorization.

Incl 1

SPNCO-RF
Mr. T. G. Cole

If you have any questions, please write or call Mr. Glen R. Stilwill of our Regulatory Functions Branch at this office (telephone 415 556-5966). If any communication regarding this matter you should refer to Monterey Harbor and Bay (11234-25).

Sincerely yours,

JAMES C. WOLFE
Chief, Construction-Operations
Division

Copy furnished:
Monterey Peninsula Water Pollution Control Agency

DEPARTMENT OF THE ARMY
HEADQUARTERS
7th INFANTRY DIVISION AND FORT ORD
FORT ORD, CALIFORNIA 93941
OFFICE OF THE DIRECTOR OF FACILITIES ENGINEERING

(HE-135) 23

AFZW-FE-E

20 June 1977

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U.S. Environmental Protection Agency
Region IX
ATTN: Hearing Office
100 California Street
San Francisco, CA 94111

Gentlemen:

We have reviewed the Draft Environmental Impact Statement and Report for the North Monterey County Facilities Plan of April 1977 and would like to offer the following comments:

a. Pages 39 and 102. There is a difference in population figures of 25,000 and 22,500. If this difference is due in reference to resident population and military strength, this distinction should be indicated.

b. Page 101. For the projected family housing units on Fort Ord, an expected occupancy rate of 3.2 persons (2.2 dependents) per unit is more accurate.

c. It is understood that Fort Ord's fair share cost of the capital facilities should be based on only those facilities necessary to transport, treat and dispose Fort Ord's wastewater in meeting legal requirements. Those facilities that do not contribute to the above requirements should not be included in the costs determining the fair share. For examples, the interceptors for Castroville, Salinas and Marina, and the transmission

AFZW-FE-E 20 June 1977
U.S. Environmental Protection Agency

main from Pacific Grove to the Fort Ord treatment plant should not be included. Also, since irrigation of crops as a water conservation measure is not a legal requirement, this phase of the system should not be included in determining Fort Ord's fair share costs. This is pointed out although it may not cause significant change in the economic impact on the different entities bearing the costs of the system.

None of the five project alternatives being considered have any direct benefit to Fort Ord nor will they help resolve the drought condition on the Monterey Peninsula. The reuse of a valuable water resource must be considered, such as watering the many golf courses on the peninsula, rather than disposing into the ocean.

The retention of the Monterey Treatment Plant for golf course watering may be a viable alternative. This would reduce the size of the transmission lines as well as a smaller regional treatment plant would be required.

There is no assurance that new public health problems would not likely develop with alternative 1, i.e., one common outfall.

The report fails to address in more detail well injection to help retard saltwater intrusion that has been advancing 500 feet per year in the Salinas Basin. This should be further investigated and included in the report.

The opportunity to comment on your EIS is appreciated.

Sincerely yours,

ROBERT D. CREMER, JR
LTC, CE
Dir, Fac Eng

CF:
HQDA
(DAEN-ZCE)
HQ FORSCOM
(AFEN-EQ)

(HE-135) 13

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS
Commander (oan)
Twelfth Coast Guard Dist
630 Sansome Street
San Francisco, CA 94126
(415) 556-8668

16591
Salinas River
Elkhorn Sl
24 May 1977

Mr. Paul DeFalco, Jr.
Regional Administrator
Environmental Protection Agency
100 California Street
San Francisco, CA 94111

Dear Mr. DeFalco:

We have reviewed the DEIS for the North Monterey County Facilities Plan and have the following comments:

p. 143 - The U.S. Coast Guard also would require permits for any pipeline bridges over the tidal (or historically tidal) portions of Elkhorn Slough, Moro Cojo Slough, Tembladero Slough, Salinas River, Old Salinas River and their tidal tributaries. Tidal effect normally ceases where the bottom elevation of these watercourses exceeds 2.5' above Mean Sea Level. Subsurface crossings within the tidal reach would be under the jurisdiction of the U.S. Army Corps of Engineers.

general - There is a minor amount of boating on Elkhorn Slough and the Salinas River, and no known navigation on other area streams. Pipeline bridge clearances sufficient to pass the 50 year flood would be acceptable on these other streams; and clearances similar to the new Highway 1 bridge would be acceptable on the Salinas River. There has been a historical demand for greater clearances on Elkhorn Slough than is provided by the existing Highway 1 bridge, and clearance requirements there cannot be determined without an opportunity for public comment and further Coast Guard investigation. It is the intention of the Coast Guard to use the EPA F.E.I.S. as the environmental information document for our decisions regarding issuance of bridge permits for this project.

The opportunity to review this statement is appreciated.

Sincerely,

J. S. BLACKETT
Commander, U.S. Coast Guard
Chief, Aids to Navigation Branch
By direction of the District Commander

(HE-135) 15

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102
(415) 556-8200

ER-77/389

June 2, 1977

Mr. Paul DeFalco, Jr.
Regional Administrator
Environmental Protection Agency
Region IX
100 California Street
San Francisco, CA 94111

Dear Mr. DeFalco:

The Department of the Interior has reviewed the draft environmental statement for North Monterey County.

Should an alternative be selected that would involve off-road construction and thereby have a severe long-term effect on rare and endangered plant habitat, we suggest that a survey of the affected area be conducted and mitigation measures proposed. It would be inappropriate to conduct such a survey after off-road construction has begun.

Site JS-MP-1, a probable pre-historic site located in the vicinity of the Seaside Treatment Plant, should be evaluated for its significance pursuant to National Register of Historic Places criteria. The State Historic Preservation Officer should be consulted to assist in determining if the site qualifies for inclusion in the National Register. Recommendations concerning additional mitigative measures should be developed in consultation with the State Historic Preservation Officer.

Alternative 1 (ocean disposal via deep ocean outfall) and Alternative 166, (discharge secondary effluent to ocean during non-irrigation months), both include excavation or covering of at least 6,400 linear feet of sandy bottom habitat in Monterey Bay. In addition, a large amount of rock and/or sand would be transported to the outfall location or excavated on site to form a berm over the pipe. Since the possibility exists that submerged archeological remains could be located in the Bay, we suggest that an archeologist trained in underwater survey techniques and knowledgeable about the resources in the area be consulted to determine if an underwater cultural resource survey of the outfall area would be advisable.

Although the proposed project should have no significant impact on mineral resource availability, we suggest that the statement describe mineral resources in more detail. According to the Bureau of Mines Mineral Industry Location System (MILS), 69 mineral properties are within the study area. Of these, 13 have been or are being mined. The commodities that have been producted include sand and gravel, crushed or broken stone, clay, barite, limestone, and dolomite.

The extensive deposits of crystalline limestone and dolomite of the Sierra de Salinas and Gabilan Mountain Ranges represent the most important mineral resources in the north Monterey County area. These carbonate rocks usually occur as lenses associated with schist, gneiss, and quartzite of the Sun Series. In some places, however, they are found as roof pendants in granitic rocks without the associated metasedimentary rocks. Relatively pure limestone is fairly widespread, while dolomite deposits of sufficient size and purity for commercial exploitation are restricted mainly to the Gabilan Range.

The most significant of the carbonate deposits is the Kaiser Aluminum and Chemical Corporation quarry at Natividad, about six miles northeast of Salinas, California. About 644,000 tons of ore and over 800,000 tons of waste are mined annually. Most of the dolomite is calcined and shipped to Moss Landing, California, where it is reacted with sea water to produce a variety of manufactured products, including magnesium hydroxide, dead burned magnesite and periclase for refractory brick and other purposes. The remainder is used to make dead burned dolomite for agricultural uses and crushed rock for roofing and landscaping.

In addition to the commodities already mentioned, peat and petroleum may have some potential for commercial development within the project area. Although the peat deposits between Castroville and Salinas have not been mined, some may be of sufficient quality for use as a soil conditioner. It is doubtful, however, that the deposits will be mined in the near future inasmuch as the lands may be more valuable for agricultural purposes. Several shallow wells have been drilled in the study area, but none yielded commercial quantities of petroleum.

The supply of treated wastewater for irrigation reuse in the Castroville area would tend to curtail saltwater intrusion into the water table and the 180- and 400-foot aquifers. However, in view of the anticipated urban growth within the project area, ground-water withdrawals for domestic and industrical uses may intensify saltwater intrusion. This potential adverse effect should also be assessed.

Clarification is needed on the use of the 4-3/8 percent interest rate quoted on p. 248. This fiscal year it is 5-5/8 percent. An additional clarification would be helpful in that this interest rate applies to excess lands only. Apparently 35 percent of the lands are excess and 65 percent are not. The later category is interest free.

We appreciate the opportunity to review and comment on the draft statement.

Sincerely,

Hardy L. Pearce

Hardy L. Pearce
Regional Environmental Officer

cc:
OEPR w/c incoming comments
Regional Director, BuRec, Sacramento
Regional Director, BOR, San Francisco
Regional Director, NPS, San Francisco
Director, USGS, Washington
Director, BOM, Washington
State Director, BLM, Sacramento

(HE-135) 19

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UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
2828 Chiles Road, Davis, CA 95616

June 7, 1977

Paul De Falco, Jr.
Regional Administrator
Environmental Protection Agency
Region IX
100 California Street
San Francisco, California 94111

Dear Mr. De Falco:

We acknowledge receipt of the draft environmental statement for North Monterey County Facilities Plan, that was addressed to the Soil Conservation Service on April 16, 1977, for review and comment.

We have reviewed the above draft environmental statement and find that there are no controversial items in the statement within the realm of the Soil Conservation Service's expertise and responsibilities. We find no conflict with any Soil Conservation Service on-going or planned programs or projects.

We would recommend additional discussion of the need to stockpile topsoil taken from borrow areas on construction sites so that it may be replaced on the sites.

We further recommend that alternates numbered 171, 166 and 134, in that order, be selected for trial as suggested in Appendix L.

We appreciate the opportunity to review and comment on this proposed project.

Sincerely,

FRANCIS C. H. LUM
State Conservationist

cc: R. M. Davis, Administrator, USDA, SCS, P.O. Box 2890, Washington, D. C. 20013
Fowden G. Maxwell, Coordinator of Environmental Quality Activities, Office of the Secretary, USDA, P. O. Box 2890, Washington, D. C. 20013
Council on Environmental Quality, 722 Jackson Place, N. W., Washington, D. C. 20006 - Attn: General Counsel (5 copies)

NOTATION TO [illegible] FILE (Env. Eval. Br.)

Telephone	In	Date [illegible]	
Conference	Out	Time	

Caller(s) or Visitor(s), Affiliation, Phone No:

Routing

Name	Action	Initial	Date
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File: 1. EIS
2.
3. (HE-135) 16
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Subject North Monterey Co. Wastewater Treatment Facilities - Draft EIS/EIR

Summary Reviewed draft EIS/EIR. No substantive comments.

Items of particular interest -

- Method for summarizing impacts. (Tables 29 and 30 on pages 129 and 195). Particularly useful in comparing alternatives. Could be means to reduce volume of text for "Issue Orienting" without a decrease in the analysis of impacts and alternatives.

(over)

Action Required No further action required at this time

Signature Alan C. Hiel
EPA HQ 245-3054

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

(HE-135) 7

MAY 19 1977

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Paul DeFalco, Jr.
Regional Administrator
U.S. Environmental Protection Agency
Region IX
100 California Street
San Francisco, California 94111

Dear Mr. DeFalco:

Thank you for the opportunity to review the draft Environmental Impact Statement on the North Monterey County Facilities Plan, Monterey Peninsula Water Pollution Control Agency. On the basis of this review, we offer the following comments:

We are pleased to note the systematic fashion in which the potential for wastewater reclamation has been discussed in the draft Environmental Statement. The North Monterey County Facilities Plan should improve water quality in portions of Monterey Bay, Salinas River, Tembladero Slough and Elkhorn Slough.

Bacterial contamination of shellfish in surface water areas should decrease. However, since the location of the ocean outfall is unknown at this time, there should be a discussion as to the effects the treated effluent might have on shellfish in that area.

The Plan also proposes to supply treated wastewater for irrigation reuse to curtail the problems of groundwater table overdrafting and salt intrusion, but actual operation of this aspect of the Plan is dependent on the results of an irregation demonstration project currently being developed. Consideration should be given to amending the Environmental Impact Statement or issuing a supplement when these results have been determined.

5/25/77 [illegible]

Since the Plan calls for storage reservoirs and percolation ponds, it is important that care be exercised in the construction and maintenance of these to preclude the possibility of mosquito breeding habitat. Several safeguards/mitigating factors are identified in the DEIS and we encourage strict adherence to such safeguards in order to minimize any potential undesirable environmental impacts resulting from the project.

Sincerely
Charles Custard

Charles Custard
Director
Office of Environmental Affairs

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION NINE

Two Embarcadero Center, Suite 530
San Francisco, California 94111

ARIZONA
CALIFORNIA
NEVADA
HAWAII
GUAM
AMERICAN SAMOA

(HE-135) 3

May 2, 1977

IN REPLY REFER TO
HED-09

Water

W-1

Mr. Paul De Falco, Jr.
Regional Administrator
Environmental Protection Agency
100 California Street
San Francisco, California 94111

Dear Mr. De Falco:

We have reviewed the Draft Environmental Impact Statement for the North Monterey County Facilities Plan and find that the alternatives discussed appear to have no major impact on the Federal-aid highway system. However, it is recommended that the California Department of Transportation District 5 Office be contacted at the following address to obtain an update of the Transportation Improvement Project status in the project area:

California Department of Transportation
State District 5
P. O. Box "L"
San Luis Obispo, California 93406

We appreciate this opportunity to review the subject Draft Statement.

Sincerely yours,

F. B. Hawley
Regional Administrator

FEDERAL POWER COMMISSION
REGIONAL OFFICE
U. S. CUSTOM HOUSE
SAN FRANCISCO, CA. 94111

(HE-135) 1

April 26, 1977

Water
Const. Grants

Mr. Paul DeFalco, Jr.
Regional Administrator, Region IX
Environmental Protection Agency
Attn: Hearing Office
100 California Street
San Francisco, California 94111

Dear Mr. DeFalco:

We have reviewed your draft Environmental Impact Statement and Environmental Impact Report for the North Monterey County Wastewater Facilities Plan, dated April 1977.

As described in the draft, the Plan is designed to improve water quality by improving wastewater treatment service to residents in the southern Monterey Bay - Lower Salinas Valley region of Monterey County, California. An additional objective is to supply treated wastewater for irrigation reuse in the Castroville area so that overdrafting of the groundwater table and related salt water intrusion problems can be curtailed.

We have reviewed the draft to determine the effect on matters affecting the Commission's responsibilities. Such responsibilities relate to the development of hydroelectric power and assurance of the reliability and adequacy of electric service under the Federal Power Act, and the construction and operation of natural gas pipelines under the Natural Gas Act.

Our review indicates that your proposals would not affect any existing electric power or natural gas facilities under the jurisdiction of the Federal Power Commission, and would not appear to have any effect on the future development of supplies and transmission of electric power or natural gas.

Sincerely,

George R Bell

GEORGE R. BELL
Regional Engineer

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

(HE-135) 5

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

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May 5, 1977

Mr. Paul DeFalco, Jr.
Regional Administrator
Environmental Protection Agency
Region IX
100 California Street
San Francisco, California 93940

Dear Mr. DeFalco:

I am replying to your request of April 8, 1977, to the Federal Power Commission for comments on the Draft Environmental Impact Statement for the North Monterey County Facilities Plan. This Draft EIS has been reviewed by appropriate FPC staff components upon whose evaluation this response is based.

Our review of other agencies' environmental impact statements concentrates basically on those areas of the electric power and natural gas industries for which the Federal Power Commission has jurisdiction by law, or where staff has special expertise in evaluating environmental impacts involved with the proposed action. It does not appear that there would be any significant impacts in these areas of concern nor serious conflicts with this agency's responsibilities should this action be undertaken.

Thank you for the opportunity to review this statement.

Sincerely,

JMHeinemann
Jack M. Heinemann
Advisor on Environmental Quality

[illegible]

(HE-135) 2

Water
Const. Grant

VED
N IX
APR 29 10 '9 AM '77

Advisory Council on
Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

April 26, 1977

Mr. Paul De Falco, Jr.
Regional Administrator
Environmental Protection Agency
Region IX
100 California Street
San Francisco, California 94111

Dear Mr. De Falco:

This is in response to your undated request for comments on the draft environmental statement (DES) for the North Monterey County Facilities Plan, Monterey County, California. The Advisory Council on Historic Preservation has reviewed the DES and notes that the undertaking will affect archeological site number (JS-MP-1), a property which may be eligible for inclusion in the National Register of Historic Places.

Pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f, as amended, 90 Stat. 1320), Federal agencies must, prior to the approval of the expenditure of any Federal funds on an undertaking or prior to the granting of any license, permit or other approval for an undertaking, afford the Council an opportunity to comment on the effect of the undertaking upon properties included in or eligible for inclusion in the National Register of Historic Places.

Until the requirements of the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), which detail the steps for compliance with Section 106 are met, the Council considers the DES to be incomplete in its treatment of historical, archeological, architectural and cultural resources. To remedy this deficiency, the Council will provide substantive comments on the undertaking's effect on the previously mentioned property through the "Procedures".

Please contact Michael H. Bureman of the Council's Denver staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946,

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October 15, 1966 to advise the President and Congress in the field of Historic Preservation.

to assist you in completing this process as expeditiously as possible.

Sincerely yours,

Louis S. Wall
Assistant Director, Office
of Review and Compliance

State of California **THE RESOURCES AGENCY**

(HE-135) 9

Memorandum

To : Mr. L. Frank Goodson
Project Coordinator
Resources Agency
1416 Ninth Street
13th Floor
Sacramento, CA 95814

Date: MAY 26 1977

From : **STATE WATER RESOURCES CONTROL BOARD**
DIVISION OF WATER QUALITY

Subject: REVIEW OF DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) STATE CLEARINGHOUSE NO. 77042516, FOR NORTH MONTEREY COUNTY FACILITIES PLAN, PROJECT NO. 76-1066

This office has reviewed the draft EIS of this project, dated April 1977. The Division of Water Quality staff has provided input on subject report during the course of its preparation; no additional comments will be forthcoming at this time. However, as a funding agency, the SWRCB reserves the right to make further comments on this report prior to granting an EIS approval pursuant to the Clean Water Grant Regulations.

Should you have any questions regarding this review, please contact Jim Lee at (916) 322-6465.

ORIGINAL SIGNED

Larry F. Walker
Division Chief
Manager, Clean Water Grant Program

cc: Tony Mei, EPA, Region IX
Bob Baldridge, CRWQCB, Central Coast Region

CALIFORNIA AIR RESOURCES BOARD

1. L. Frank Goodson
   Projects Coordinator
   Resources Agency

2. Monterey Peninsula Water Pollution
   Control Agency
   1011 Cass Street
   Monterey, CA 93940

May 26, 1977

North Monterey
County Facilities
Plan - Northern
Monterey County
SCH. No. 77042516

We have reviewed the North Monterey County Facilities Plan draft environmental impact statement (DEIS) prepared to identify and assess the potential environmental impacts of five facility plan alternatives. The facility plan is designed to improve water quality by improving wastewater treatment (secondary) service for the study area which encompasses 332 square miles of northern Monterey County. The plan also projects the wastewater treatment capacity needed to accommodate anticipated growth in the service area to the year 1995. The projected population increase between 1970 and 1995 ranges between 113,000 and 143,000 people. The 1970 study area census was approximately 191,000 people.

The DEIS presents a thorough review of the air quality impact which will accompany the above population increases and concludes on page 301, "... if development actually occurs at the rate anticipated by local planning agencies and assumed as a basis for sizing the proposed project, the federal health-related air quality standards for photochemical oxidant will not be achieved and maintained during the period through 1995." The DEIS analysis clearly demonstrates (Figures 44, 46, and Table 47) that a photochemical oxidant problem currently exists in Monterey County and will continue into the future unless mitigation measures are developed and implemented. This analysis is, furthermore, probably optimistic since the analysis is based on emission factors that are currently being revised upwards by the Environmental Protection Agency (EPA).

The DEIS presents (pages 306-315) a commendable discussion of potential mitigation measures that could be implemented to offset the growth-related air quality impacts. This includes:

1. Reduced sizing of the proposed project,

2. Limitation of the flow rate to the treatment plant, and

3. Possible transportation and land use measures local agencies could implement to reduce emissions.

It is important that the EIS contain a summary table listing specific mitigation measures that could be implemented by local jurisdictions. This table needs to

include the jurisdictions responsible for implementation of the measures identified, the feasibility of implementation, and an estimate of when these measures could be initiated. As stated on page 341, the matter of implementing adequate mitigation measures is a problem which needs early resolution since the Monterey Peninsula Water Pollution Control Agency has limited authority, and any specific control measure would have to be implemented by other agencies.

Mitigation of adverse environmental impacts is supported by the California Environmental Quality Act as amended by the Legislature in 1976. Public Resources Code Section 21002 now provides that "public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects". Section 21002.1 further provides that "each public agency shall mitigate or avoid the significant effects on the environment of projects it approves ... whenever it is feasible to do so".

WILLIAM C. LOCKETT

William C. Lockett, Chief
Planning Division

CALIFORNIA DEPARTMENT OF FISH AND GAME

MAY 26 1977

1. L. Frank Goodson, Projects Coordinator
Resources Agency

2. Monterey Peninsula Water Pollution Control Agency
1011 Cass Street
Monterey, California 93940

Attn: Dudley Lapham, Manager

Project and Environmental Impact Statement Review and Comment, North Monterey County Facilities Plan (SCH 77042516).

We have reviewed the subject document which describes the environmental impacts expected to occur as a result of the construction and operation of a secondary wastewater treatment plant designed to provide service to residents of the cities of Monterey, Salinas, Seaside, Marina, Pacific Grove, Sand City, Del Rey Oaks, Castroville, Moss Landing, and Fort Ord Military Reservation. In general, the report accurately describes fish and wildlife resources and impacts associated with the project, although additional data and information regarding the construction and operation of the ocean outfall are being collected at the present time.

On the basis of our review, the Department offers the following recommendations:

1. Implement an alternative which includes no less than (a) secondary treatment, (b) agricultural reclamation in conjunction with stream flow augmentation with adequately treated effluent or other appropriate water during low flow conditions of the Salinas River, and (c) ocean disposal in compliance with the State Water Resources Control Board's "Ocean Plan." This alternative constitutes a slight modification of those identified by the project sponsors as alternatives 134 and 166. With respect to stream flow augmentation we concur with the need for additional studies to determine the feasibility of dry weather stream flow in the Salinas River.

2. Amend subject document to reflect the present status of marine resources of the Monterey Bay area.

3. Construct the treatment plant at site 4. The Department would object to construction at site 3 because of potential adverse impacts to wildlife habitat in the Salinas Wildlife Area.

Following are additional comments relating to specific sections of the report:

Page 10 - The report correctly identifies a concern of the Department of Fish and Game related to the impacts of ocean disposal, i.e., changes in species diversity and a gradual increase in the heavy metals content of adjacent bottom sediments. Furthermore, the report identifies the

fact that long term effects on marine biota from the discharge of effluent are not completely known, nor completely predictable. Hence, we recognize a need for intensive or comprehensive monitoring studies upon completion and operation of the subject facilities.

Page 15 - We support the intent of the north Monterey County facilities of providing a regional severage framework with an emphasis upon reclamation of effluent for agricultural and other uses. Should a stream discharge alternative not prove feasible, we are in support of continued agricultural reuse to lessen the impacts associated with the diversion and use of natural water sources for agricultural uses.

If a decision is made to discharge to the Salinas River, then we recommend that a complete study of Salinas lagoon water quality in relation to fish and wildlife beneficial uses be undertaken. Such a study should include an identification of 1) impacts on fish and wildlife if no stream discharge is made and the Salinas discharge is eliminated, and 2) affects on fish and wildlife resources in the river and lagoon if stream augmentation or supplementation of agricultural water supplies through reuse alternatives are adopted.

Page 39 - The Department of Fish and Game believes that commercial fleets will probably remain the same size in Moss Landing and Monterey.

Page 84 - The report implies that a single epifaunal community referred to as an amphipod-ostracod-sand dollar association, commonly occurs throughout the marine disposal area. When data from the predischarge marine benthic studies become available, it will be appropriate to revise the impact statement to reflect a more accurate and quantitative description of the area.

Page 85 - Sardines are present, but rarely seen in Monterey Bay.

Page 97, Table 13 - The sea otter range is from Avila Beach to Santa Cruz. Approximately 100 sea otters range within the study area.

Page 99 - The discussion of estuarine and aquatic resources of the Salinas River lagoon appears to be limited to qualitative observations and general knowledge of the life histories of commonly occurring species. A more detailed analysis of the invertebrate, fish and avian communities of the estuary should be included to fully assess the impacts or potential impacts to this valuable fish and wildlife habitat.

Page 105 - The 1972 value of commercial fisheries in Monterey Bay, i.e., the wholesale dockside price paid to fishermen, was $2.9 million. We believe that if an economic comparison between the local military complex and the local fisheries must be made, the figure should include the total value of the fishing industry, including processing and retail revenues. Non-quantifiable recreational benefits, such as tourism in the harbor areas and Cannery Row should be partially attributable to the commercial fishing industry.

1. L. Frank Goodson, Projects Coordinator
2. Monterey Peninsula Water Pollution
   Control Agency

Page 132-134 - The discussion of infauna and the benthic communities is rather limited, although we are aware that comprehensive benthic studies are ongoing. We suggest that information collected in such predischarge studies be compiled and made available for environmental impact statement review.

Page 329 - Unavoidable Adverse Impacts - Under the summary entitled "operation," we believe that the following potential adverse impacts of ocean disposal should be considered:

a) Biological accumulation of trace elements
b) Biological accumulation of trace organic materials
c) Chronic toxicity from chemical constituents in dilution zone
d) Impact of growth inducing factor causing increase in waste loading to marine environment.

We appreciate the review opportunity. Please contact Mr. Robert Kaneen, (213) 590-5117, if you desire additional information on our comments.

S

Director

MI:PTP:sg

bcc: ESB
Region 3
MRR-Long Beach
rf

State of California Department of Health

Memorandum

To : Health and Welfare Agency
Attention Assistant to the
Secretary, Operations
915 Capitol Mall, Room 200

MAY 24 1977 Date : May 23, 1977

Subject : SCH 77042516

From : Environmental Health Services Branch

We agree that the Alternative 134 in itself will not obtain the goal of swimmable, fishable waters nor will it protect shellfishing for human consumption near the mouth of the lower Salinas River.

Therefore, we concur in the Alternative 166 as recommended by the Engineering Science Firm. We believe that the Alternative 166 will provide adequate disposal should the irrigation demonstration project reveal that the irrigation of vegetables to be eaten raw is unacceptable.

Kenneth Buell, Chief

Attachment

bcc: Buell ✓
Browning
Stewart
Witt

HRW:gm

cc: State Clearinghouse

Mike Rushton
Jones and Stokes, Associates
2321 P Street
Sacramento, CA 95816.

7/26/77

(HE-135) 22

STATE OF CALIFORNIA—RESOURCES AGENCY
EDMUND G. BROWN JR., Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—
CENTRAL COAST REGION
1122-A LAUREL LANE
SAN LUIS OBISPO, CALIFORNIA 93401
(805) 549-3147

June 20, 1977

RECEIVED
REGIONAL HEARING CLERK
JUN 21 1977
REGION IX

U.S. Environmental Protection Agency
Region IX
100 California Street
San Francisco, CA 94111

Attn: Hearing Office

Gentlemen:

Re: Draft Environmental Impact
Statement and Report, North
Monterey Facilities Plan

Subject document has been received and reviewed by my staff. For its size, the report is remarkably error-free. The agencies' consultants are to be commended for a thorough disclosure of potential impacts of the project, insofar as existing data permitted. Conclusions, significant issues to be resolved, and the recommendation given on pages 15 and 328 were, however, disappointing.

Although the following facts were known, the authors of the report selected beneficial impacts to fish and wildlife resources to equate river disposal with ocean disposal in their final recommendation:

1. Assuming reuse for irrigation, water for flow augmentation would only be available "during the non-irrigation (November to March) season", thus of limited benefit (page 11).
2. Considerable effort has been expended to reduce water levels in the lagoon to protect adjacent high productive agricultural lands. The recommendation ignores such other beneficial interests.
3. Higher capital costs for river disposal (page 10).
4. Higher O & M costs (born 100% by local taxpayers) for river disposal (page 10).
5. Greater potential for public health and water quality problems (pages 11, 231, 248, and 326).
6. State Water Quality Control Board's Water Quality Control Policy for the Enclosed Bays and Estuaries of California prohibits new discharges to estuaries unless it can be demonstrated that all existing beneficial uses will be protected and that either (1) they will be enhanced or (2) new use(s) will be created (page 339).

7. This Board (RWQCB) has for some time had a policy to terminate, as soon as feasible, municipal wastewater discharges to fresh water bodies.
8. Fish and wildlife resources are not well documented (page 99).

It appears to us that the facts amply support the conclusion that Alternative 166 is environmentally superior to Alternative 134. Impacts on fish and wildlife resources by removal of a portion of the flow into the lower Salinas River could be mitigated.

We were surprised that details regarding location and minimum acceptable flow volume to maintain fisheries and riparian habitat were still unknown. When these are determined, the mitigation measure can then be appropriately evaluated. We disagree with the conclusion reached on page 248 regarding disposal reliability during long duration noncompliance of waste discharge requirements. Disposal through a deep ocean outfall during such times would be much safer and have the least long-term environmental impact. The river or estuary is always more sensitive to environmental damage than is the larger, deeper Monterey Bay location.

On June 10, 1977, the Board took steps to amend the prohibition date for discharges to south Monterey Bay as contained in the Basin Plan and on page 569 of the report. If concurrence is obtained from the State Board and EPA, the new prohibition date will be July 1, 1983. The Board also adopted enforcement orders against the peninsula cities which require elimination of the discharges to the south bay by 1982, which coincides with the estimated project completion date given by the agency.

Omissions which we suggest be corrected include:

Page 81 - Delineation of RWQCB discharge prohibition zone in north Monterey Bay.

Page 573 - Wildlife habitat is a recognized beneficial use in coastal waters both north and south of the Salinas River.

We hope these comments will be helpful.

Very truly yours,

Kenneth R. Jones

KENNETH R. JONES
Executive Officer

KRJ:RCB:rlm

(HE-135) 26

STATE OF CALIFORNIA
EDMUND G. BROWN JR., Governor

CALIFORNIA COASTAL COMMISSION
CENTRAL COASTAL REGIONAL COMMISSION
701 OCEAN STREET, ROOM 310
SANTA CRUZ, CALIFORNIA 95060
(408) 426-7390

ION IX
JUL 11 1:2 PM '77

June 17, 1977

Tony Mei, Project Evaluator
Construction Grants Branch, Water Division
U.S. Environmental Protection Agency, Region IX
100 California Street
San Francisco, CA 94111

Dear Tony:

As you are aware, the California Coastal Commission is the agency designated to implement the requirements of the Coastal Act of 1976. Although many of the functions of this agency are similar to those of the predecessor commissions under the Coastal Act of 1972 (Proposition 20) certain areas of jurisdiction and regulatory responsibility have changed. Even though the agency has changed we want to stress that for the evaluation of this project the staff perspective has been maintained by using personnel originally assigned to the technical advisory committee for the Monterey Peninsula Walter Pollution Control Agency.

In order to facilitate a clear understanding of our concerns, we have divided our evaluation comments between those of a general nature followed by specific comments referenced to pages in the EIS.

General Comments

In our staff review of the Draft EIS we found the document to be voluminous, often redundant, difficult to decipher how certain aspects of the proposed alternatives were derived, generally lacking in a clear history of the project selection process, and yet quite comprehensive for the information which was presented.

We are concerned by the fact that generally the EIS/EIR procedure is an integral step in the decision making process. This process is usually a complete evaluation providing regulatory agencies with sufficient data to make rationale decisions. However, in this EIS there are numerous significant issues identified as still being unresolved. How is a decision making body going to select the best alternative when answers from studies are unavailable or the studies are never going to be done? The obvious approach is to avoid providing information which in turn automatically limits the number of feasible alternatives! Rather than taking this approach and reaching the early conclusion specified in the Summary on page (15) we suggest making some additions and modifications to the document. These changes to the EIS would hopefully provide an accurate appraisal of the project alternatives for public review and the decision making process.

To facilitate the reader in understanding the complexity of such a large project a complete explanation should be included at the beginning of the EIS which contains the following:

A general project description and

1. the size of the proposed facility including the specific criteria used to determine the size (i.e. multiplier of g.p.c.d., p.w.w. projected population, etc.);

2. grant funding breakdown with the grant eligible portion; federal, state and local estimated shares;

3. when the decisions are anticipated for project implementation (i.e. implementation time-line for all phases of the project);

4. a listing of all outstanding studies, and unanswered or unresolved questions;

5. an assessment of the effect the incomplete studies or unanswered questions will have on the selection of a final project;

6. a statement as to why certain studies or significant questions remain unanswered;

7. projected population figures directly correlated to the AMBAG planning areas (include a map);

8. future areas to be sewered by the proposed project (include a verbal description or a more accurate map than Fig. 2); and

9. a list of the expected impacts with proposed and implementable mitigation of the impacts.

Additionally, we suggest the inclusion of a discussion of recreational use and future demand in the study area. This discussion should include the anticipated reserve sewerage capacity for this use. Finally, we recommend that the Final EIS include maps showing, (a) land use under existing zoning, (b) land use under resource constraints, and (c) future land use in the study area. These maps would be helpful in visually representing the numerous sections of the EIS which verbally describe changes in the future service area.

We hope that our comments will be helpful to you. The information contained in the Draft EIS has already helped the Commission staff in its analysis of pending permit applications and in preparing review outlines of the Local Coastal Program implementation process. Please contact the undersigned if we can be of further assistance.

Sincerely,

EDWARD Y. BROWN
EXECUTIVE DIRECTOR

Les Strnad
Les Strnad
Coastal Planner

STATE OF CALIFORNIA EDMUND G. BROWN JR., Governor

CALIFORNIA COASTAL COMMISSION
CENTRAL COASTAL REGIONAL COMMISSION
701 OCEAN STREET, ROOM 310
SANTA CRUZ, CALIFORNIA 95060
(408) 426-7390

Summary Comments

p. 1 Is Moss Landing part of the regional system--statement is misleading when taken in context of discussion on pgs. 23 & 24.

p. 2 para. 3, last sentence: Taking of shellfish is more than a frequent occurance in Elkhorn Slough; an actual ban exists. "Frequently" is a nebulous term--how many times & the duration over the last ten years would provide a more accurate description of the problem.

p. 4 para. 2: What percentage of the estimated population will utilize septic systems; what is the estimated population for sewered and potential expansion of sewered areas?

" para. 5: Project alternative elimination process implies that "all assumptions" received by the TAC were agreed to--this is untrue; if the record of the meetings was reviewed the basis for many of the assumptions were questioned. Such general statements give a false impression to the public.

Fig. 2 Does not show industrial discharges off Moss Landing.

p. 11 para. 2: Comparison between Alternative 166 & 134 implies that ocean discharge in the winter season mitigates the impacts of 166 whereas 134 could create water quality problems. Wouldn't Alt. 134 be discharging during the winter season, during the time of the year when freshwater runoff is the greatest?

p. 12 para. 3: The figures on population do not correspond to those presented on p. 4, nor to the calculated growth rates.

" para. 4: Mitigation for the potential loss of prime agricultural should be mentioned as a future objective caused by secondary impacts. Additionally, an increased demand for public service facilities (schools, major recreational facilities, hospitals, etc.) will also increase sewer loads for those specialized services.

p. 13 para. 1: Statement should continue with conclusion that some form of water reclamation is essential, etc.

" para. 2: Statement should continue that therefore information generated as part of "208" studies should be incorporated with the alternative which is finally selected and implemented.

" para. 2: Is the statement in the first sentence correct? An improvement of future oxidant levels does not correspond with the other information.

p. 14 para. 1: Statement should indicate that unless Alternative 134 were selected alternative sources of water would be essential for mitigation.

p. 15 This is a good example of the environmental review procedures being used to justify a preconceived solution to the problem. Why was the analysis of the lagoon avoided in the first place? The fact that over 8 million dollars for an ocean outfall might be saved under a similarly staged system as Alt. 166 does not provide a good example of alternative project analysis.

Summary - General Comments

Summary discussion does not indicate the size of the future regional facility, nor the amount of discharge volume.

p. 17 Growth-related Impacts--last statement should include "i.e., . . .unique vegetation, and prime agricultural land).

p. 24 last para.: What is the status of the Moss Landing facility? This statement still implies regional consolidation of all existing facilities.

p. 25 para. 4: If Ft. Ord's land disposal and irrigation reuse project is successful, why would the Army want to tie into the regional system?

p. 34 Soils Section--We recommend the inclusion of the Prime Agricultural Soils Map in this section, and a map to relate the potential new sewered areas and Fig. 10 to the existing land use map.

p. 36 para. 6: The 800-acre Wildlife Area managed by the California Dept. of Fish and Game is a National Wildlife Refuge administered by the U.S. Fish and Wildlife Service as part of the San Francisco Region Refuge System.

p. 40 para. 7: When will the Corps re-evaluation of the flood potential be available for public review?

p. 70 para. 1: This statement should be modified to include recent information from D.W.R. report "North Monterey Water Resources Investigation" March, 1977.

p. 73 para. 3: Statement and Fig. 23--should be modified to correspond to D. Pirie's final publication, "California Coastal Processes Study - Landsat II Final Report Landsat Investigation #22200".

p. 81 Fig. 24: Discharges in Moss Landing area should include cannary outfalls.

p. 88 para. 4: See comment p. 36 para. 6.

p. 102 Table 16: A map should be added to indicate the AMBAG Planning Areas to which the Table 16 data refers.

p. 104 para. 3: This statement should be expanded to explain the relationship between mandatory water conservation programs and the effects that a reduced g.p.c.d. would have on the sizing of the treatment facility.

p. 108 Table 19: An additional water demand table should be included which reflects the concern expressed on p. 104.

p. 121 para. 1: Under the revisions of the permit area of the Coastal Act of 1976 all of sites 1, 2, 3, & 6 are within the regulatory jurisdiction of Coastal Commission. The new Coastal Zone in this area is located at the existing Hwy. 1. . .only sites 4 & 5 are not under our agency's jurisdiction.

p. 123 Alt. site 3 - (see previous comment).

p. 127 para. 2: See comment p. 36 para. 6.

p. 135 para. 2: Elkhorn Slough is also being evaluated as a candidate National Estuarine Sanctuary pursuant to Section 312 of the Federal Coastal Zone Management Act of 1972 (P.L. 92-500).

p. 143 para. 1: Please update and revise to reflect the regulatory and planning requirements of the Coastal Act of 1976.

p. 147 para. 1: Is the Moss Landing area still part of the regional consolidation? How does the recently approved Step 1 Grant to the Castroville Sanitation District relate to the regional consolidation program?

p. 151 para. 2, Alt. 134--An explanation why some of the T.A.C. members questioned the "tertiary" requirement should be included in the discussion section.

p. 154 para. 2: What was the economic disadvantages as evaluated by E. S., Inc.? Dismissal of the sites at Fort Ord requires a more detailed explanation.

p. 163 para. 4: Is a cost/benefit analysis for off-site energy use going to be done?

p. 166 Table 32: Where is Table III - 7 which was utilized to determine the average D.W.F.?

p. 172 para. 1: What is the controversy which has developed over the level of treatment which would be required for discharge to the lower river? How does this concern relate to the use of level III or level V treatment?

" para. 2: Why is the plant's design capacity for Alt. 134 (26 m.g.d.) 1.6 m.g.d. greater than in Alt. 1?

p. 176 para. 1: Why is the design capacity for Alt. 166 less than Alt. 134 & Alt. 170?

" para. 3: How large would the wastewater storage facility have to be to store winter flows?

p. 182 para. 1: Has the cost of a geohydrologic study been determined? Will this study be done?

" para. 2: What percentage of the projected populations would be located in presently unsewered areas? By what basis were population projections determined, growth rates, land use plans, zoning?

" para. 3: Because it was difficult to predict population growth in the Salinas and Castroville areas doesn't seem like a logical reason to over design an already high-cost facility. An evaluation of land use restrictions and a determination of the local government's capability of providing adequate public services to those areas would be a good start towards realistic population expectations. An over-designed sewer facility could have significant growth-inducing impacts in these predominantly rural areas.

p. 184 The general discussion of "Waste and flow reduction measures" is encouraging considering the severe water shortage within the study area; however, why is the figure of 74 gpcpd utilized if the design of all facilities and the costs could be reduced through the measures as illustrated?

p. 199 Groundwater Quality--Reference to the California Dept. of Water Resources Report "North Monterey Water Resources Investigation" March, 1977, should be included in this discussion section.

p. 201 para. 1: Reference to the Castroville Irrigation Project implies that this project will alliviate some of the water problems. Is this project (CIP) still viable, and if so, when will it be built?

p. 201 para. 4: This statement is only true if the additional winter storage facilities for Alt. 134 & Alt. 166 aren't built.

p. 203 para. 1: If the question of an appropriate method for sludge disposal requires a geologic study as suggested by RWQCB, couldn't this study be expanded into the geohydrologic study discussed on page 182?

" para. 3: What percentage of upstream reservoir releases reach the river below the Blanco Drain?

p. 206 para. 2: What type of study, how long would it take, and how much would it cost to determine whether nitrogen and/or phosphorus are limiting factors in this water course?

p. 217 para. 2: Was the information from U.C. Davis mapped?

p. 225 para. 1: Is there a "back-up" contingency plan for sewage treatment in the event a rupture occurs in the pipeline between the peninsula cities and the treatment plant?

p. 226 para. 4: When is the anticipated completion date of the detailed geotechnical evaluation? This appears to be a rather significant piece of information needed prior to making a selection of a preferred alternative.

p. 230 para. 2: The statement concerning the beneficial use of taking shellfish if the "bacterial" contamination is removed is a misleading statement. Based upon previous comments this would only be true if non-point source contaminants are not limiting as well.

p. 234 "Impacts on Terrestrial Wildlife and Vegetation". This section fails to discuss potential impacts on the Salinas River National Wildlife Refuge. Since this refuge is part of the near riparian area of the lower river system the impacts and mitigation techniques should also address the refuge specifically.

p. 241 para. 4: (See previous comment.) Does this statement propose a direct discharge to the federal wildlife refuge? Such a proposal would have to be in full compliance with the President's Executive Order on the Protection of Wetlands 5/24/77.

p. 242 para. 4: If the Potrero Road tidegates were closed on the Old Salinas River how or by what mechanisms would the Salinas Valley flows reach the ocean?

p. 270 para. 5: To date, land and resources constraints have not played a significant role in directing or controling growth, especially in the northern portion of the study region.

p. 272 para. 1: If not "indefinetely", how long can growth continue without a conjunctive water management program? Wouldn't the transport of water through the sewer system further aggrevate the overdraft on the Hill Unit Hydrologic Sub-basin? (See D.W.R. report.)

" para. 4: The intent of the 1976 Coastal Act is not to discourage "urbanization" through the regulatory process of the Coastal Commission. The Coastal Act requires the concentrating of development in urbanized areas and utilizing land constraints as development guides.

p. 274 para. 1: The trend for new growth in rural areas has been occuring in north Monterey County. The ideal and most desirable land use planning approach would have been the concentration of development in existing urban areas where existing public services were available. Further research should be done to assess the past trends of growth in this region.

Without incentives to concentrate development in existing urban areas growth will always move toward the suburban/rural areas. With rural growth comes new demands for public services generally at high costs both environmentally and economically. We therefore disagree that "most of the north county" could be a growth center. Monterey County's 1964 and 1968 General Plan more realistically identified future growth centers (i.e. Prunedale, Castroville, Las Lomas/Hall). The topography alone will limit most of north Monterey County from becoming "urban".

" para. 3: Your statement is quite true, the "comparison is admittedly very rough". A generalized characterization of future residential acreage requirements must eventually consider a theoretical if not the actual areas "carrying capacity". There are natural limits to growth, an entire section of this document if not the intent of the whole project analysis is based on an "actual" water supply crisis in the Monterey Bay Region.

p. 275 para. 3: An average urban density of 26.6 persons per residential acre is probably not a realistic figure for most "rural" areas of Monterey County. This figure might be appropriate if all 3,000 acres were incorporated within city boundaries. If this growth is within unincorporated lands the acreage figure will be much higher.

p. 280 para. 4: This statement begins to address the concern we raised on p. 274, the past planning efforts in this region have been based on the premise of unlimited growth.

" para. 5: What was the final criteria utilized by the project engineers in providing the SWRCB with the potential service area? The criteria stated on p. 182? Facility plans of the local General Plans? Land use plans?

p. 285 para. 2: Oak Hills is a suburban subdivision as discussed on p. 284. Las Lomas is neither an urbanized area nor contiguous to an urban area. It should be mentioned that Las Lomas (outside of the project study area) is currently under a Regional Water Quality Control Board building ban due to failure of numerous septic tanks. Las Lomas is currently under a Step Grant Program with

" alternatives indicating transport of the areas wastewater to the Pajaro system via a pipeline; therefore, it is unlikely that Las Lomas will be served by the regional system discussed in this document.

p. 285 para. 3: The statement concerning soil limitations for septic tank use north of Marina is misleading. The 1975 S.C.S. report indicates "severe" septic tank limitations for most of the soils of north Monterey County. In working with the Monterey County Health Department we have been informed that the S.C.S. data is generally disregarded when dealing with septic tanks. Rather the health department staff relies upon site by site analysis since the underlying soils are generally much different than those indicated in the S.C.S. report.

" para. 4: Sufficient land may exist to absorb 25 years of "low" density growth but are the infrastructural resources going to be available? (See earlier comments on D.W.R. report.)

p. 287 para. 3: What about other factors such as the preservation of critical natural resources (i.e. Elkhorn Slough Estuarine Complex, Salinas River National Wildlife Refuge, etc.)?

p. 292 para. 3: A population utilizing a water conservation program and a population without water conservation which utilize the same size sewerage facility will not have the same growth potential. The more water saved through conservation, the greater the residual treatment capacity.

p. 322 para. 4: (See comments p. 36 para. 6); therefore, limitations for the use of reclaimed wastewater would have to comply with federal standards.

p. 323 para. 1: (See previous comment.)

p. 337 Issues to be Resolved - (see introductory comments).

ambag
ASSOCIATION OF MONTEREY BAY AREA GOVERNMENTS
P. O. BOX 190, 1011 CASS STREET, MONTEREY, CALIFORNIA 93940 • TELEPHONE (408) [illegible]3-6477

IX
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June 16, 1977

Mr. Paul De Falco, Regional Administrator
U.S. Environmental Protection Agency Region IX
100 California Street
San Francisco, CA 94111

Dear Mr. De Falco:

(HE-135) 20

Attached for your information are the comments of the Association of Monterey Bay Area Governments on the draft Environmental Impact Statement for the proposed North Monterey County Facilities Plan, as approved by the AMBAG Board of Directors on June 8, 1977.

Sincerely yours,

Jack Liebster

Jack Liebster
Regional Planner
Areawide Clearinghouse

JL:acs

Enc.

Member Agencies: Counties of Monterey and Santa Cruz, Cities of Capitola, Carmel, Del Rey Oaks, Gonzales, Greenfield, King City, Monterey, Salinas, Santa Cruz, Scotts Valley, Seaside, Soledad, Watsonville. Associate Member: Fort Ord

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ambag
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N IX
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June 8, 1977

(HE-135) 20

Mr. Dudley Lapham, Manager
Monterey Peninsula Water Pollution Control Agency
PO Box 190
Monterey, CA 93940

Dear Mr. Lapham:

As you know, the AMBAG Board of Directors has identified the North Monterey County Facilities Plan as a project of regional significance.

Of the six alternatives still under consideration and evaluated in the Draft EIS, the Project Engineers' recommended alternative is consistent with AMBAG's 1973 Water Quality Management Plan for a "regional plant near the Salinas River (with) effluent used for irrigation in the Lower Salinas Valley." The magnitude and complexity of the project make it appropriate for us to divide our continuing involvement into two stages:

(1) the review of the completeness and adequacy of the EIS, which is the subject of this letter, and

(2) the formulation of policy on the water quality and land use issues presented by the project. We wish to work closely with you on this policy as the EIS is finalized and as you develop your Design and Construction Grant applications for our review under A-95. The work will be undertaken as part of the 208 program, consistent with State and EPA positions on the relationship of 208 and facilities planning.

In our review of the Draft EIS itself, we found it to be generally clear and comprehensive, given the available information. However, in view of the EIS's role in decision-making, there is a particular need for clarity regarding several questions, and we ask the final EIS address these more directly:

1. ISSUES TO RESOLVED

The EIS acknowledges that several questions important to the design of the project are as yet unanswered. They include the feasibility of reusing wastewater for irrigation of vegetable crops, the impacts of a regional ocean outfall, the effect of removing Salinas River discharges on the quality of water in the Salinas River Lagoon, and the air quality implications of growth accommodated by the project. In Sections 2 and 3 below we identify several additional questions potentially affecting project design. It would be helpful if the EIS more clearly identified when decisions will be made on the project and how the unanswered questions will affect the selection of a project.

Member Agencies: Counties of Monterey and Santa Cruz, Cities of Capitola, Carmel, Del Rey Oaks, Gonzales, Greenfield, King City, Monterey, Salinas, Santa Cruz, Scotts Valley, Seaside, Soledad, Watsonville. Associate Member: Fort Ord

2. TECHNICAL CONSIDERATION

Facilities plans are not total water resource management plans, nor are they intended to be. However, in this case a danger of "sub-optimization" exists - that the best solution for a given problem (treatment and disposal of wastewater) may not be the best for a larger problem (increasing demands for limited water supplies). In light of this, the basis for selecting between the remaining alternatives would be improved if the EIS elaborated on the following technical considerations:

A. Interrelationship with the Castroville Irrigation Project (CIP)

The relationship of the different alternatives to the CIP is not entirely clear in the EIS. The data presented on alternatives 134, 166, 170 and 171 assume that all or part of the CIP will be constructed. The EIS could facilitate the evaluation of the alternatives by:

(1) describing the feasibility of reclamation if the CIP is not constructed.

(2) including the CIP component of each alternative in the evaluation of their costs and impacts; i.e., what are the cost savings on the CIP made possible by each alternative.

B. Groundwater Quality:

The EIS includes discussion of potential contamination of groundwaters used for municipal supply. To fully assess the groundwater impacts of each alternative, it would be helpful to indicate which municipal wells will be impacted, and their present quality.

C. Geohydrologic Investigations:

The feasibility of underground storage cannot be determined without relatively expensive geohydrologic investigations of possible storage areas (pg. 182). Because underground storage is vital to alternative 171, and could increase the reclamation potential of alternatives 134 and 166, it is important to know the cost of the investigations and present plans as to whether or not they will be performed.

D. Winter Storage of Tertiary Treated Effluent:

A small amount of algae in tertiary treated effluent does not make it unsuitable for irrigation use (pg. 178). Thus, provision of intermediate storage before tertiary treatment seems unnecessary. Does this significantly affect the cost of alternative 171?

E. Financing:

The financing of the project assumes certain amounts of State and Federal grants and revenues from an assumed level of population growth and new hookups. What would be the effect on the local share of financing plan if :

(1) grant levels were limited by the State Water Resources Control Board to E-0 or the new DOF E-150 population levels, and

(2) anticipated population growth did not occur.

3. SECONDARY IMPACTS

A. Growth Inducement:

The EIS defines "secondary impacts" as "the outcome of changes in the pattern of use of land and natural resources for which the project can be seen as the sole or contributing cause", and describes those changes. The degree to which the planned facilities are "the sole or contributing cause" for those changes, and consequently the degree the facilities should be modified to mitigate their adverse effects is a subject of debate. We suggest the EIS can clarify this question by presenting information on whether or not:

(1) the project imposes additional costs (such as increased tax assessments) upon open land and thus stimulates development that might not otherwise occur.

(2) the project accommodates growth by removing existing constraints (building bans, density restrictions related to septic tank capability) or affects pattern of growth by favoring development of those lands closer to the regional interceptors.

B. Impacts of Growth:

The EIS generally describes the impacts of "likely future growth" in the study area. We would appreciate clarification in the following topics:

(1) Land Use: The assumptions on population growth used in design of facilities for each sub-area can be inferred from dispersed references in the report, but it would be helpful if they were pulled together in one section. It is not always clear whether these assumptions conform to general plans. For example Figure 2 seems to imply urban densities in the Prunedale and three other smaller areas when the adopted plans call for much lower densities.

(2) Water Supply: The EIS states (p.291) "If sewer facilities are installed and other basic services are provided so that population increase, in the absence of additional water supplies, there would be even more serious overdrafting of existing local water supplies. Because of the building ban on the peninsula, growth would likely occur to a greater degree in the Salinas, and Castroville areas and the North County...and would intensify the overdrafting of the 180 and 400 foot aquifers...and the increase of the salt water intrusion problem in the Castroville area." Since these are serious concerns of several of our member agencies and AMBAG itself, and are likely to influence policy positions on the project, we feel the EIS should present quantitative estimates of these impacts.

(3) Non-Point Sources: The EIS states that AMBAG's 208 planning is the "proper vehicle" for addressing growth related water quality problems. Since facilities planning began well before our 208 planning, close cooperation between our agencies will be necessary; we hope to continue that cooperation.

(4) Air Quality: Congress may amend the requirements for automotive emission controls. How would estimates of future air quality change under these different assumptions? The EIS could also include an assessment of traffic impacts following from its "likely growth" assumptions.

(5) Agricultural Lands: The EIS should note where the facilities plan assumes development of agricultural lands, as appears to be the case around Salinas and part of the Toro area.

4. **MITIGATION MEASURES**

A. A possible mitigation measure discussed by AMBAG's Environmental Policy Advisory Committee, is the prohibition of hook up to interceptors where they cross agricultural lands. Could such a prohibition be implemented by this project?

B. The EIS lists a number of ways to mitigate the projects impacts and several agencies which could possibly implement them. It is unclear which of these measures, if any, are included as part of the proposed project.

Many of the measures proposed are outside of the direct control of the Monterey Peninsula Water Pollution Control Agency or the Environmental Protection Agency, but are within the powers of the cities and counties that comprise the Monterey Peninsula Water Pollution Control Agency and AMBAG. The object of AMBAG's present planning is to form the technical and institutional arrangements among those agencies to mitigate the adverse impacts of growth identified in the EIS. We look forward to working with you towards that end in the further development of this project.

We would be happy to discuss any of these comments with you, and thank you for the opportunity to offer them.

Sincerely yours,

For Sam Farr
President

JL:acs

(HE-135) 4

MONTEREY COUNTY

DEPARTMENT OF HEALTH — ROBERT J. BOWERSOX, M.D., DIRECTOR

PUBLIC HEALTH — ENVIRONMENTAL HEALTH
MENTAL HEALTH — NATIVIDAD MEDICAL CENTER
☐ 1270 NATIVIDAD ROAD, SALINAS, CALIFORNIA 93901 (408) 757-1061
☐ 1200 AGUAJITO ROAD, MONTEREY, CALIFORNIA 93940 (408) 373-0111
☐ 1001 DIVISION STREET, KING CITY, CALIFORNIA 93930 (408) 385-4824
☐ 1281 BROADWAY AT NOCHE BUENA, SEASIDE, CALIFORNIA 93955 (408) 899-4271

PLEASE REPLY TO ADDRESS CHECKED

RECEIVED
REGION
May 11 1977

May 9, 1977

U.S. Environmental Protection Agency
Region IX
Attention: Hearing Officer
100 California Street
San Francisco, California 94111

To Whom It May Concern:

I have reviewed the Environmental Impact Report for the North Monterey County Facilities Plan dated April 1977. Page 228 states that meeting the present State Health Standards is all that is necessary for use of tertiary effluent for unrestricted irrigation purposes. I am concerned that the conclusion drawn is inadequate in that it implies that there are no public health problems with use of tertiary effluent for irrigation of artichokes and other food crops.

We have brought to the attention of the Environmental Protection Agency and the California Water Resource Control Board that the use of such tertiary treated effluent for irrigation of food crop has not been adequately demonstrated to verify that the State Standards are adequate. The State Standards were developed many years ago by utilizing comparison to recreational water purposes. Since bringing this matter to the attention of both federal and state government, we have found that no research or practical application of proposed treated effluent of crops such as lettuce and artichokes has been made in California or elsewhere in the United States.

The questions that we have raised are health concerns that can affect consumer and farm worker.

1. Virus survival and potential transmittal of disease to the farm worker by the food crop, soil, and residue water.

2. Heavy metal and other chemical absorption by the food crop through roots, as well as dermatology and other disease problems related to the farm worker needs to be answered.

3. The absorption of virus through the food crops is a potential problem.

4. The reentry time for safety of the farm worker before exposure of virus and chemical accumulated on the soil and on food crops has not been answered.

5. The cumulative factor of heavy metal and other chemical in soil eventually filtering into groundwater needs to be investigated.

6. The cumulative effect of chemicals in soil that are absorbed by the food crop is a consumer problem.

Because of the above questions, the State of California has granted Monterey County Peninsula Water Pollution Control Agency a five-year 2.2 million dollar demonstration project to prove the above questions that have been raised in the use of tertiary treated effluent on food crops. Thus, recognizing that these questions need to be answered, we ask that the statement be amended. One of the major concerns of virus and disease is that it is not practical to monitor virus in California or anywhere else. As an example, in California, there are only one or two laboratories that are qualified to perform virus tests. Some viruses such as hepatitis have not been identified yet.

Based upon above reasons, we would ask that Environmental Impact Report be corrected to state these issues and not accept the traditional assumption that it is safe to use tertiary effluent on food crops simply because it is stated in the law.

Sincerely,

Walter Wong

Walter Wong, M.P.H., R.S.
Director of Environmental Health

WW:ro

cc: D. Lapham, Manager
Monterey Peninsula Water Pollution Control Agency

Paul DeFalco, Regional Administrator
Environmental Protection Agency

Chairman Norris, Board of Supervisors

Loren Bunte, Flood Control

Bill Huffan, Farm Advisors Office

5/6-12

(HE-135) 25

MONTEREY COUNTY

THE BOARD OF SUPERVISORS

ERNEST A. MAGGINI, COUNTY CLERK
AND EX-OFFICIO CLERK OF THE BOARD OF SUPERVISORS
POST OFFICE BOX 1819 - SALINAS, CALIFORNIA 93901

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June 14, 1977

Environmental Protection Agency
Region IX
100 California Street
San Francisco, California 94111

SUBJECT: CASTROVILLE COUNTY SANITATION DISTRICT, (EIR/EIS, NORTH MONTEREY COUNTY FACILITIES PLAN

Gentlemen:

The Monterey County Public Works Director, as District Engineer for the Castroville County Sanitation District, recommends that the ultimate plan of the present regional wastewater study which envisions the pumping of primary effluent from Castroville to regional facilities near Fort Ord and its return for agricultural use should be re-evaluated in light of recent developments.

It now appears that a demonstration program is being developed under which tertiary facilities will be constructed at Castroville. These facilities will utilize the sewage from the Castroville area to establish the feasibility of agricultural use of reclaimed effluent in that area. Should the program prove that feasibility, we are seriously concerned over the projected abandonment of those demonstration facilities and the proposed pumping of the effluent to regional facilities just north of Marina's Disposal Site to be followed by its return, again by force main, to the Castroville area for use without an economic and environmental evaluation of the permanent retention of these facilities as a newly available alternate.

We are concerned that the current EIR does not address itself to this development as an alternative and consider the elimination of the force main from Castroville to regional facilities as possibly unessential and uneconomical because of these projected new facilities. This alternative using the fully treated Castroville effluent locally could, if environmentally acceptable and approved, eliminate the construction maintenance and operation costs together with the accompanying high energy use of that force main. This would reduce the construction requirements to one force main distributing treated effluent to ultimate users not already served by the demonstration facilities.

We urge that this re-evaluation receive your serious consideration in view of economies that may be achieved.

Very truly yours,

Chairman
Board of Directors

MW:jt
cc: MPWPCA

(HE-135) 14

MONTEREY COUNTY

FLOOD CONTROL AND WATER CONSERVATION DISTRICT

(408) [illegible] - P.O. BOX [illegible], COUNTY COURT HOUSE, SALINAS, CALIFORNIA [illegible]

LORAN BUNTE, JR.
DISTRICT ENGINEER

May 25, 1977

U. S. Environmental Protection Agency
Region IX
100 California Street
San Francisco, California 94111

Subject: Draft Environmental Statement and Report on North Monterey County Facilities Plan

Gentlemen:

Pursuant to your request for comments, I submit the following:

The statement is made that some of the ground water is extracted but most flows underground into Monterey Bay. This may be true of the shallow "perched" aquifer but not the 180' or 400' aquifers.

Page 199 - The statement is made that no estimate of present ground water overdraft in the Pressure Area is available. They site the 1955 estimate of 20,000 acre feet. In the Castroville Irrigation Project EIR it is estimated that an average overdraft of 55,000 acre feet per year will occur with ultimate development.

Page 257 - None of the proposed treatment plant sites are in a flood prone area.

Page 56 - The statement is made that releases from the dams are percolated to the ground water or diverted for municipal and agricultural use. There are no diversions from the river.

Very truly yours,

Loran Bunte Jr
LORAN BUNTE, JR.
DISTRICT ENGINEER

LBjr/hs

cc: Monterey Peninsula Water Pollution Control Agency
Each Member of the Monterey County Board of Supervisors
Walter Wong, Monterey County Environmental Health Officer
J. W. Huffman, Monterey County Director and Farm Advisor

(HE-135) 18

CITY OF SALINAS

TELEPHONE (408) [illegible]

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OFFICE OF THE CITY MANAGER

June 3, 1977

Mr. Matthew Walker
Hearing Officer
Environmental Protection Agency
Region 1X
100 California Street
San Francisco, California 94102

Dear Mr. Walker:

The City of Salinas has reviewed the draft EIR/EIS on the North Monterey County Facilities Plan and has found the discussions on the impacts affecting the Salinas area to be adequate except for one item.

We have been unable to find a discussion of the short and long term agricultural impacts of the placement of the waste water pipelines between Salinas and the proposed regional treatment facility. The lands immediately west of the Salinas Main Treatment Plant have been shown to be the most productive in the Salinas area, and a thorough discussion of pipeline route alternative and placement techniques may insure that the placement will result in the least disruption of the intense farming operation in that area.

Our comments have been limited to those impacts most directly affecting Salinas. We appreciate the opportunity to comment on the draft environmental document for this very important project.

Very truly yours,

ROBERT M. CHRISTOFFERSON
City Manager

RMC/ED:hi

cc: Monterey Peninsula Water Pollution
Control Agency

200 LINCOLN AVENUE SALINAS CALIFORNIA 93901

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GEORGE S. NOLTE AND ASSOCIATES
Civil and Environmental Engineers • Planners • Surveyors

June 14, 1977
Job No. 313-76-20

U.S. Environmental Protection Agency
Region IX
Attn: Hearing Office, Matthew S. Walker, HE 135
100 California Street
San Francisco, CA 94111

Dear Mr. Walker:

On May 18, 1977, Charles S. Kahr made an oral presentation at the public hearing for the Draft Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) for the North Monterey County Wastewater Facilities Plan. Mr. Kahr is employed by George S. Nolte and Associates who act as District Engineer for the Marina County Water District. The intent of this letter is to summarize the comments Mr. Kahr made at the public hearing and to address additional items not presented at that time.

George S. Nolte and Associates has recently prepared a report (copy submitted at public hearing) entitled "Wastewater Disposal, Reclamation and Reuse Study" covering the results of investigations into alternative solutions for handling the District's wastewater flows. Eleven alternatives were studied, including joining the proposed regional system, and after comparisons were made, two viable alternatives were recommended for further detailed investigation. The two alternatives currently being studied in more detail include:

1) A modified disposal system to Monterey Bay; and

2) staged implementation of wastewater reclamation and reuse, initially involving irrigation of fodder, landscaping, and/or processed food crops.

These alternatives permit the continued use of the District's recently expanded 2 mgd secondary treatment plant which has capacity to serve the ultimate (year 2000) service area population, and allow the District to maintain and operate their own disposal system.

The following list of comments on the Draft EIS should be responded to in the Final EIS:

1731 North First Street, P.O. Box 820, San Jose, California 95108. (408) (287-3400)
SAN JOSE • WALNUT CREEK • SOUTH SAN FRANCISCO • SAN DIEGO

1. What would be the impact on the Marina landfill operation if the regional treatment plant were located on that site. Specifically, what will be the effect on the design storage capacity of dump; will its effective life be reduced, if not, what was the proposed use of that land (40 to 50 acres). Also, is that land going to be purchased and if so for how much?

2. For Alternative 166, what will be the biological impacts of the periodic use of the ocean outfall, i.e., how will the fish and other sea life be effected by the change in ocean discharge flow rates throughout the year. Can the organisms around the diffuser adapt to the change in flows from zero discharge during the summer months to maximum discharge during the winter months? During periods of zero discharge, will the diffuser clog up with benthic invertebrates?

3. Page 9 of the EIR talks about the proposed alternatives easing the local water shortage situation, but the EIR does not say how using effluent to irrigate crops in the Castroville area which rely on groundwater will help the Monterey Peninsula which relies primarily on surface runoff and storage in dams.

4. Page 10 mentions the initial revenue program (Bartle Wells Associates, 1976), but does not mention that the cost estimates in that report do not include the tertiary treatment plant costs, the distribution system costs to Castroville, or the right-of-way costs. Also, the $4.50 per month user charge for single-family dwellings is no longer the recommended charge rate.

5. Page 22 mentions that the Marina County Water District is a member of the MPWPCA joint powers agreement which is incorrect.

6. Page 40 indicates a moratorium on new sewer connections is in effect in Marina, however, this moratorium has been lifted for quite a while.

7. Page 149 says "extension of the existing Marina Outfall for the purpose of serving only Marina was determined to be relatively expensive and infeasible", however, evaluation of this alternative by George S. Nolte and Associates has shown this extension to be definitely feasible and one of the least expensive alternatives available to Marina.

8. Page 206 implies that Marina's discharges create an occasional health hazard on the beaches, however discussions with the Monterey County Health Department (Walter Wong and Glenn Joesten) indicate the Marina Outfall is not a health hazard.

9. Page 228 indicates State regulations allow tertiary treated effluent to be used for unrestricted irrigation practices, however, currently the Monterey County Health Department will not allow irrigation of any food crops with tertiary effluent.

10. Page 259 again mentions the old user charges rates which cover only Stage II construction.

When the final EIR is published, please send a copy to George S. Nolte and Associates so we may review it for the Marina County Water District. If you have any questions about the report we submitted at the public hearing or wish additional copies, please feel free to contact me at (408) 287-3400.

Very truly yours,

GEORGE S. NOLTE AND ASSOCIATES
FOR MARINA COUNTY WATER DISTRICT

Charles S. Kahr

Charles S. Kahr

md

cc: Marina County Water District

SIERRA CLUB ~ VENTANA CHAPTER

(HE-135) 24

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REGION IX
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June 14, 1977

U.S. Environmental Protection Agency
Region IX
100 California Street
San Francisco,
California 94111

Dear Sirs:

The Ventana Chapter, Sierra Club herewith submits its assessment of the Draft Environmental Impact Statement and Report for the North Monterey County Facilities Plan. We also designate our tentative choice of Alternative (s) to be implemented under the Plan.

The Chapter agrees with the concept of regional wastewater disposal and the reuse of reclaimed water for irrigation, where public health and environmental concerns permit. We are in favor of eliminating multiple wastewater outfalls into the Monterey Bay and the point-source pollution such discharges cause. We are equally interested in eliminating non-point source pollution into the Bay and other waterways of our area.

From the DEIS/EIR, however, it appears that in the process of cleaning up the area's point-source pollution problems, the Plan will directly or indirectly lead to a significant increase in non-point source water pollution. We find this potential of the Plan inimical to the mandates of the Federal Water Pollution Control Act of 1972 and its amendments; we thus urge that measures be devised and utilized to avoid what promises to become a vicious cycle. Certainly, if the Federal 201-Planning Program is heading into a situation which will negate the purpose and efforts of the concurrent and related 208-Planning Program, some sort of reassessment should be made while there is still time.

Given the information presently available, we consider the DEIS/EIR to be reasonably comprehensive in ferreting out and addressing the multitude of concerns posed by the Project. However, we are appalled by the number of significant questions --important to the design and functioning of the Project -- that are yet to be resolved. Lack of research or data on critical issues involved in every Alternative, makes a responsible decision on any option difficult at present.

Considering the DEIS/EIR's important function in decision-making, we suggest that the present document is incomplete and premature. It is inadequate for the purpose of choosing a workable and environmentally appropriate Alternative at this time. The "draft" probably should be regarded as an advanced "working paper", with a more comprehensive version to be produced when various uncertain issues have been clarified.

Should all of the basic problems about irrigation reuse of wastewater in the area under discussion be resolved, and should the unknowns about

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water quality in the Salinas River Lagoon and near-shore ocean waters at the River's mouth be determined with favorable prognosis, our first choice as the option to be implemented would be Alternative 134. This option not only provides a beneficial reuse of treated wastewater for irrigation but is the only one that also would benefit and enhance the wildlife and vegetation in the Lower Salinas River and Lagoon, which otherwise will be significantly impacted by the Project.

However, if basic problems associated with Alternative 134 should remain unsolved or prove beyond safe mitigation , then we regard Alternative 166 as the best all-around choice.

There are several questions posed while reading the DEIS/EIR that we would appreciate having answered:

1) How will the various unresolved issues get resolved. Who is responsible for resolving them? When resolved, will the public be notified?

2) When will decisions be made on the project? Before or after major uncertain issues are resolved?

3) What will happen if EPA does not approve the Alternative chosen?

4) If the Castroville Irrigation Project is not put into effect, will the reuse of reclaimed water actually be feasible for Alts. 134, 166, 170 and 171? How do the costs of these two Projects relate to each other; has the cost of using reclaimed water been figured with and without the Castroville Project?

5) Will the cost of the Project, and the development of areas surrounding open lands, stimulate increased tax assessments and lead to the loss of agricultural lands that otherwise would not have taken place?

6) Will the geohydrological feasibility of underground storage be investigated before any Project decision is made?

7) On Table 45, why is the ultimate size projected for the Facilities Plan so large?

A few suggestions in closing:

1) The total cost of the project should include the price of the collector systems for unsewered, inadequately sewered, or currently undeveloped residential areas within the service area or at least these hidden costs should be estimated and included in the DEIS/EIR.

2) The "significant long term" impacts of failure to revegetate excavations along the Salinas River, Tembladero or Alisal Slough (p. 190) are not indicated on Table 38, construction impacts.

3) The southern sea otter, Table 13, should be designated: *Enhydra lutris nereis*; the Table has omitted the subspecific name of this marine mammal. On page 96, delete the last line: "reoccupying much of their former range";

the southern sea otter now occupies only 165 miles (10%) of its former range (Baja California to the Straits of Juan de Fuca). The southern sea otter should not have been omitted from the discussion, p. 193, of wildlife species that might be impacted by the Project. This fragile marine mammal, recently designated as a "threatened" species under the Endangered Species Act, occurs in the Monterey Bay and depends solely on marine invertebrates for food. The cumulative effects of marine pollutants in its forage items could be significant for this keystone species, which consumes up to 25% of its body weight daily and is at the top of the food chain.

4) Considering that the foundations of the area's economy -- tourism and agriculture -- both stand to be significantly impacted by the indirect effects of the population growth accomodated by the Project, we urge that more attention be paid this aspect of the Flan in the Final EIS/EIR.

We appreciate the opportunity to review and comment upon the Draft EIS/EIR for the North Monterey County Facilities Plan.

Respectfully submitted,

Betty L. Davis

Betty S. Davis, Ph.D.
Water Task Force
Wildlife and Endangered Species Comm.

Star Route, Box 80
Carmel Valley, Ca. 93924

Sierra Club - Ventana Chapter
P.O. Box 5667 Carmel, CA.
93921

(HE-135) 17

LEAGUE OF WOMEN VOTERS OF SALINAS
SALINAS, CALIFORNIA

RECEIVED
REGION IX
JUN 7 10 42 AM '77

June 2, 1977

League of Women Voters of Monterey County
Monterey Peninsula: Valley Way & Highway 1
Carmel, California 93021

Salinas: 217 Oak Street
Salinas, California 93910

RECEIVED
REGIONAL HEARING CLERK
JUN 7 1977
REGION IX

U. S. Environmental Protection Agency
Region IX
Attn: Hearing Office
100 California Street
San Francisco, California 94111

Dear sirs:

The League of Women Voters of Monterey County thanks you for this opportunity to comment on the proposed waste-water facility in North Monterey County. Two aspects of the project are particularly covered by League positions.

First, we welcome the cooperation of local governments toward a regional facility which will serve them all. The Land Use position of the League of Women Voters of California encourages "...regional bodies with authority in land use planning in matters of more than local concern." In this instance of regional cooperation, many local problems will be resolved by a regional, not a duplicated, facility.

We also applaud the thorough investigation of the possible use of reclaimed water. Reclamation of water is a stated goal of our State position on Water Quality. Castroville, with its water problems, is an excellent candidate for receipt of water recovered through reclamation. We also support the careful testing required before reclaimed water is used on a large scale, and place the highest priority on the protection of the public health.

Public participation in government is always a goal of the League of Women Voters. We appreciate the effort which has been made to inform the public of progress on the Monterey Regional Waste Water Management System, and hope these comments will be of some use to you.

Yours,

Barbara Shipnuck

Barbara Shipnuck, President
League of Women Voters of Salinas

Janet O Morris

Janet Morris, President
League of Women Voters of Monterey Peninsula

(HE-135) 11

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REGION IX
JUN 1 10 25 AM '77

May 31, 1977

Matthew S. Walker, Hearing Officer
EPA – Region IX
100 California St.
San Francisco 94102

Dear Mr. Walker:

I was unable to attend the Environmental Impact hearings for the Monterey Peninsula Regional Waste Water Management System.

However, I would like to express my preference for Alternative 134 because of its possible benefits to fish and wildlife by providing an additional freshwater source during the fall and winter months.

It seems most desirable to have a system for managing waste water if it can be done in a way that doesn't do vast damage to wildlife habitat and that is not excessively growth-inducing.

Sincerely

(Ms.) Bobbie Harms
26500 Val Verde Drive
Carmel, CA 93923

Please include my comments in the record.

6/1/77
cc: [illegible]
T. [illegible]
I.P.

(HE-135) 10

RECEIVED
REGION IX

13 Wyndemere Vale
Monterey, CA 93940

MAY 27 11 21 AM '77

U. S. Environmental Protection Agency
Attn: Hearing Office
100 California Street
San Francisco, CA 94111

Dear Sirs,

Thank you for sending me a copy of the Draft Environmental Impact Statement for the North Monterey County Facilities Plan. I think the EIS is well written and clearly organized. I have no substantial criticisms of the statement or of its contents. I like the idea of applying treated wastewaters to croplands for several reasons: 1) reduced agricultural usage of potable water supplies, 2) percolation of water into aquifers and reduced salt water intrusion, 3) beneficial use of the nutrients in the wastewaters, and 4) reduced ocean pollution. I also like the regional aspect of the proposal as such a regional, consolidated approach can encourages innovative solutions and reduced conservatism.

My only objection to the statement is that I don't think your alternative solutions went far enough. Today with the environmental movement, we realize that all environmental processes are interrelated in multifarious ways and that possible solutions, while curing one problem, may cause other problems. Thus we must begin emphasizing those solutions which have beneficial impacts in multiple areas and not just one area. President Carter has provided an example of this point in his call for "co-generation" of steam and electrical energy for multiple uses. Thus I feel EPA should give greater consideration to alternative wastewater treatment solutions that have beneficial impacts in other areas such as water supply or solid waste disposal. Such alternatives may have economic or environmental benefits that may offset some of the construction or operations costs of wastewater treatment. Also such alternatives provide steps toward the eventual necessity of recycling all our waste products as energy, land, and materials costs continue to rise.

I. Water Supply

1) Several years ago Paul Patchick (Geologist), Dr. Lowell Adams (Biologist), and Carl Hooper (Civil Engineer), all of the Monterey Peninsula, formed a group promoting the "Living Filter Method" of tertiary treatment of wastewaters by spraying on croplands and then retrieval of treated water from shallow wells or other means. Their proposal never made it politically because of conservatism of public health agencies and, because of the low cost, disinterest of engineering companies. I feel EPA should consider the possibility of water recycling via biological treatment on soils. I feel if properly designed with large land areas provided by cooperating farmers,

such a system could use water quality of less than secondary treatment (possibly with only primary treatment) and consequently reduce costs of wastewater treatment while increasing potable water supplies.

II. Solid Waste Disposal and/or Electric Power Generation

Nearby the proposed wastewater treatment facilities are 1) the Monterey County Public Refuse Disposal area where sanitary land fill operations are carried out, and 2) the Moss Landing Power Station of the Pacific Gas and Electric Company. The proximity of these facilities suggests that various types of "co-treatment" may be possible. Some possibilities might be the following:

1) Composting of solid wastes with partially treated sewage or sludges for production of composts, mulches, or soil additives. Such additives should find a ready market in the Salinas Valley, particularly as energy costs rise.

2) Methane production. With the rapidly increasing costs of natural gas, there may be possible alternatives that would produce methane gas using sewage alone or in combination with solid wastes from the Refuse Disposal area.

3) Electric power production. In cooperation with Pacific Gas and Electric Company. it may be possible to dispose of sewage sludges and/or solid wastes at the Moss Landing Power Plant. This would require grinding the wastes, recovery of metal magnetically, and the mixture of the wastes into fuel oil for injection into power generation boilers.

I am not a chemical engineer and thus I have little idea of the relative costs involved in these proposals. I do feel, however, that we must begin considering solutions that have multiple benefits in a variety of areas. Only by such multiple use facilities can we keep costs reasonable while maintaining our environment.

Sincerely,

Douglas R McLain

Douglas R. McLain, PhD

SUGGESTIONS

(HE-135) 8

ORVILLE C. MATHERN
1738 GOODWIN
SEASIDE, CAL.
93955

April 9, 1977

Dear Sir:

I have been looking over our waste water system. I have seen Alternative 170 + 171 at work. A good one to see is over around Los Banos. Even see cattle in green pasture and green fields. All comes from irrigation. I have also been back to the Middle West and they use both. Ponds + Reservoirs.

So Alternatives 170 and Alternatives 171 are the answer.

Sincerely,

O.C. Mathern

RESPONSE TO COMMENTS ON THE DRAFT EIS/EIR

The following pages include responses to questions and comments on the Draft EIS/EIR voiced at the public hearing or received in written form. The responses have been grouped into a number of general categories or issue areas to avoid repetition in answering similar questions. A separate category has been set aside to respond to questions requiring specific answers or discussions. The matrix on the following page identifies each respondent and the category(ies) under which his comments have been considered.

SUMMARY OF WRITTEN AND ORAL COMMENTS ON DRAFT EIS/EIR, LISTED BY MAJOR ISSUE

Respondents	Issues																							
	Air Quality/Transportation	Archeology	Water Supply	Fish, Wildlife, Vegetation	Groundwater	Landfill Operation	Ocean Outfall	Wastewater Storage	Food Crop Irrigation	River Disposal	Castroville Irrigation Project	Fort Ord Participation	Marina Participation	Growth	Agricultural Land Conversion	Construction Impacts	Resolving Issues	Project Financing Costs	Additional Alternatives	Alternatives Preference	Response to Specific Questions	Text Revisions	No Response Required	Page Number of Letter, Comment
WRITTEN COMMENTS																								
Federal Agencies																								
U. S. Army, Chief of Engineers - Washington, D.C.												x										x		446
U. S. Army Corps of Engineers - San Francisco																						x		447
U. S. Army - Fort Ord Division of Facilities Engr.			x				x											x	x			x		448
U. S. Coast Guard																						x		449
U. S. Department of Interior - San Francisco		x		x	x																	x		450
U. S. Department of Agriculture - SCS																x				171				451
U. S. Environmental Protection Agency Headquarters																							x	451
U. S. Department of Health, Education & Welfare							x																	452
Federal Highway Administration																					x			453
Federal Power Commission - San Francisco																							x	453
Federal Power Commission - Washington, D.C.																							x	454
Advisory Council on Historic Preservation		x																						454
State Agencies																								
State Water Resources Control Board																							x	455
California Air Resources Board	x																							456
California Department of Fish and Game				x			x													134&166		x		457
California Department of Health																				166				458
Regional, Local Agencies																								
Central Coastal Regional WQCB										x										166	x	x		459
Central Coastal Regional CCZCC			x					x		x	x	x		x							x	x		460
AMBAG	x				x			x			x			x	x		x	x			x			464
Monterey County Department of Health									x															467
Monterey County Board of Supervisors																			x					468
Monterey County Flood Control and WCD																						x		468
City of Salinas																x								469
Organizations, Firms, Individuals																								
George S. Nolte & Associates			x			x	x		x									x				x		469
Sierra Club - Ventana Chapter								x	x		x			x	x		x	x		134	x	x		471
League of Women Voters - Salinas																				Recl.				472
Ms. Bobbie Harms																				134				473
Mr. Douglas R. McLain, Ph.D.																			x					473
Mr. O. C. Mathern																				170-171				474
ORAL COMMENTS																								
Mr. Earl Moser	x																							410
Mr. Charles Kahr						x	x		x		x		x					x	x			x		412
Mr. David Berry																			x					418
Ms. Gail Christen																			x	171	x			420
Mr. W. C. Woodworth																			x					421
Mr. Ferdinand Rutt																			x	170-171				423
Mr. Robert Greenwood																		x						424
Mr. Dudley Lapham													x						x					431
Mr. Jim Conner																				Recl.				436
Mr. J. C. Lyons																		x	x	170-171	x			437
Mr. Paul Till																		x						438
Mr. Walter Wong								x	x															439
Mr. Warren Hurst							x				x										x			441
Mr. Herman Weaver																					x			443

Air Quality

Changes in Emission Control Requirements

Any delays in implementing the currently adopted California vehicle emission standards, as a result of state or federal legislation, would result in higher pollutant emissions than forecast in the Draft EIS/EIR. It should be noted that 1977 automobiles sold in California must already meet the "statutory" federal hydrocarbon emission standard goal of 0.41 grams per mile. The existing federal and state standards for new automobiles are shown below.

EXHAUST EMISSION STANDARDS*
(GRAMS PER MILE)

	HC	CO	NO_x
1977 federal standards	1.5	15.0	2.0
1977 California standards	0.41	9.0	1.5
Federal "statutory" (1978) standards	0.41	3.4	0.4

* Source: California Air Resources Board, 1977. Fact Sheet on Automobile Emissions Standards as They Relate to the Current Clean Air Act Debate. 12 pp.

Congressional action regarding vehicle emission standards will delay implementation of the NO_x and CO standards than the HC standards (which are currently being met in California). In its recent actions, Congress did not consider any action which would revoke California's authority to invoke emission standards more stringent than the federal standards. Proposals have been introduced in the state Legislature which would alter the procedure by which California vehicle emission standards are set, but no action has been taken on these proposals at present. The procedures used in the Draft EIS/EIR correlate ambient oxidant levels only with hydrocarbons, not NO_x emissions. Although the existing new car emission standards for hydrocarbons have been extended, the data in the Draft EIS/EIR has not been altered due to Congressional action on the Clean Air Act.

It should be recognized, however, that the linear rollback procedure used in the Draft EIS/EIR fails to account for the influence of NO_x emissions on oxidant levels. Congressional action to alter the NO_x emission standards might affect oxidant air pollution levels, but this cannot be quantified by the procedures used in the Draft EIS/EIR.

Emission Estimates in Draft EIS/EIR

The calculations performed by Mr. Moser contain a mathematical error. Mr. Moser appears to have dropped a decimal point in his calculations. Using 0.4 grams per mile for the THC emission rate and 8 million VMT per day, the resultant THC emission estimate would be 3.2 metric tons per day, not 32. This equates to 2.9 short tons per day.

The Draft EIS/EIR did not use a 0.4 gram per mile emission factor. This factor (actually 0.41 gm/mile) applies only to new automobiles. As vehicles age, their pollution control devices deteriorate. Table V of Appendix A-7 (Volume II of Final) presents the emission rates actually used in the calculations for the Draft EIS/EIR. The 1995 emission factor for light-duty autos was estimated in the EIS/EIR as 0.99 grams per mile. Considering all vehicle types, a composite THC emission rate of 2.43 grams per mile was assumed for 1995.

While the Draft EIS/EIR used a 1995 automobile emission rate 2.4 times greater than the "new car" standard, recent evidence indicates that this emission rate is still an underestimate. New vehicle emission factors are presently under review by federal and state agencies. Publication of this new data is expected in September or October of this year.

Air Quality Mitigation

As a consequence of the air quality analyses presented in the Draft EIS/EIR and the May 10, 1977 EIS/EIR Addendum, sizing of the treatment plant portion of the proposed project has been reduced to the capacity required to serve an E-0 population growth rate in the service area. As noted in the Draft EIS/EIR, such a measure is intended to assure that the project does not foster conditions which might interfere with the attainment and maintenance of air quality standards.

The effectiveness of this action by the Monterey Peninsula Water Pollution Control Agency has been evaluated by preparing new air quality projections based on the new plant sizing. These forecasts used procedures identical to those described in the Draft EIS/EIR and its Addendum. A major assumption for this analysis was that the reduced treatment plant sizing would in fact influence service area growth rates. To be consistent with procedures used in other analyses presented in the Draft EIS/EIR, the D-100 growth rate was assumed to be the "base" situation, with an E-0 growth rate occurring only within the project service area.

Tables 50 and 51 present the population and VMT levels used for this analysis. Stationary source growth factors are presented in Table 52. The motor vehicle growth factors used for this air quality evaluation have been presented in Table V of Appendix A-7 in the Draft EIS/EIR (now in Volume II of Final EIS/EIR). Power plant and aircraft emissions were assumed to be unchanged from values used in the Appendix A-7 analysis. Table 53 presents the resultant emissions forecast while Table 54 presents the projected max-hour oxidant and NO_2 air pollution potential.

This analysis indicates that an E-0 growth rate in the project service area will allow attainment of the federal oxidant standard in about 1985, and maintenance of that standard until about 1992 (based on MCTS data for VMT levels and assuming natural background oxidant levels of 0.005 ppm). Nitrogen dioxide levels should remain below the state 1-hour standard (assuming MCTS data for VMT levels). Construction of the proposed project should be accomplished by 1981.

The Association of Monterey Bay Area Governments has recently recommended designation of Monterey and Santa Cruz Counties as an Air Quality Maintenance Area (AQMA). The above analysis does not contradict such an action. The analysis of an E-0 growth rate in the project service area shows a potential for periodic violations of the oxidant standard through about 1985. And, as discussed regarding a previous comment, future year vehicle emission rates may be underestimated by current data.

Thus, some measures such as those discussed in the Draft EIS/EIR would appear necessary if the federal oxidant standard is to be attained prior to 1985. Data from the Draft EIS/EIR Addendum and Table 53 indicate that a reduction in projected RHC emissions of 8.3 tons per day would be needed to indicate attainment of the federal oxidant standard by 1980.

Two measures, which may soon be implemented by the Air Resources Board and the Monterey Bay Unified Air Pollution Control District, might provide as much as half of this reduction: vapor recovery systems at gasoline storage and retailing facilities; and changes in the solvent base used for paints and related architectural coatings. Locally implemented land use and transportation measures may be required to

Table 50

E-0/D-100 COMPOSITE POPULATION PROJECTIONS

Year	California Department of Finance D-100 County Projection[1]	SWRCB D-100 Grant-Fundable Service Area Projection[2]	SWRCB E-0 Grant-Fundable Service Area Projection[2]	E-0/D-100 County Composite Projection[3]
1973	255,400			255,400
1974	261,600			261,600
1975	271,600	166,819		271,600
1980	299,000	185,639	178,810	292,171
1985	329,800	204,973	191,360	316,187
1990	362,100	227,109	203,921	338,912
1995	396,500	249,205	216,532	363,827

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[1] California Department of Finance, 1974.

[2] Don Perrin, State Water Resources Control Board, pers. comm.

[3] Countywide D-100 forecast minus State Water Resources Control Board, D-100 grant-fundable service area forecast, plus State Water Resources Control Board E-0 grant-fundable service area forecast.

Table 51

COMPARISON OF POPULATION/VMT FORECASTS

Parameter	Forecast Basis	1973	1974	1980	1985	1990	1995	% Change 1973-1995
Population	E-0/D-100 Composite[1]	255,400	261,600	292,171	316,187	338,912	363,827	42.5
Daily VMT	Adjusted ARB-DMV[2]	3,460,685	3,573,781	4,154,833	4,618,289	5,037,658	5,457,436	57.7
Population	E-0/D-100 Composite[1]	255,400	261,600	292,171	316,187	338,912	363,827	42.5
Daily VMT	Adjusted MCTS[3]	4,972,959	5,142,676	6,029,252	6,725,730	7,384,768	8,107,317	63.0

NOTES:

[1] See Table 50.

[2] 1973 and 1974 values from unadjusted ARB-DMV data in Table IV of Appendix A-7 (Volume II). 1980-1995 VMT extrapolated on a population basis from D-100/ARB-DMV data in Table IV of Appendix A-7.

[3] 1973 and 1974 values from D-100 based adjustment of MCTS data in Table IV of Appendix A-7. 1995 VMT extrapolated on a population basis from unadjusted MCTS data in Table IV of Appendix A-7. 1980-1990 VMT calculated as follows (Pop = population):

19-- VMT = (19-- Pop - 1974 Pop) ÷ (1995 Pop - 1974 Pop) X (1995 VMT - 1974 VMT) + 1974 VMT.

Table 52

EMISSION SOURCE GROWTH FACTORS

Source Category	Growth Factors Compatible With E-0/D-100 Composite Projection				
	1974	1980	1985	1990	1995
Petroleum marketing	1.00	1.11	1.21	1.29	1.39
Surface coatings	1.00	1.39	1.70	2.18	2.64
Degreasing	1.00	1.39	1.70	2.18	2.64
Dry cleaning	1.00	1.11	1.21	1.29	1.39
Other solvent users	1.00	1.11	1.21	1.29	1.39
Food processing	1.00	1.23	1.42	1.67	1.90
Pesticide use	1.00	1.02	1.04	1.06	1.08
Other industry fuel use	1.00	1.39	1.70	2.18	2.64
Domestic and commercial fuel use	1.00	1.11	1.21	1.29	1.39
Agricultural and range burning	1.00	1.02	1.04	1.06	1.08
Other waste burning	1.00	1.11	1.21	1.29	1.39
Miscellaneous area sources	1.00	1.11	1.21	1.29	1.39
Trains and off-road vehicles	1.00	1.11	1.21	1.29	1.39

NOTES AND SOURCES:

All growth factors normalized to 1974 as a base year.

D-100 based growth factors in Table VII of Appendix A-7 (Volume II) multiplied by the ratio of E-0/D-100 composite projection to the County D-100 projection (see Table 50).

Table 53

PROJECTED HYDROCARBON AND NITROGEN OXIDE EMISSIONS, E-0 COUNTY COMPOSITE POPULATION PROJECTION BASIS

	Projected Emissions (Tons Per Day, Annual Average)											
	1980			1985			1990			1995		
Source Category	THC	RHC	NO$_x$	RHC	RHC	NO$_x$	THC	RHC	NO$_x$	THC	RHC	NO$_x$
Petroleum marketing	3.6	3.4	0.0	3.9	3.8	0.0	4.1	4.0	0.0	4.4	4.3	0.0
Solvent users:												
Surface coatings	3.6	3.3	0.0	4.4	4.1	0.0	5.7	5.2	0.0	6.9	6.3	0.0
Degreasing	2.5	0.4	0.0	3.1	0.5	0.0	3.9	0.7	0.0	4.8	0.8	0.0
Drycleaning	1.0	0.0	0.0	1.1	0.0	0.0	1.2	0.0	0.0	1.3	0.0	0.0
Other	3.4	2.6	0.0	3.8	2.8	0.0	4.0	3.0	0.0	4.3	3.2	0.0
Food processing	0.0	0.0	1.0	0.0	0.0	1.1	0.0	0.0	1.3	0.0	0.0	1.5
Pesticides	3.4	3.4	0.0	3.4	3.4	0.0	3.5	3.5	0.0	3.6	3.6	0.0
Fuel combustion:												
Power plants	1.4	1.4	31.8	1.8	1.8	40.0	2.2	2.1	47.8	1.6	1.6	35.8
Other industry	0.1	0.1	13.6	0.2	0.2	16.7	0.2	0.2	21.4	0.3	0.3	25.9
Domestic and commercial	0.1	0.1	1.7	0.1	0.1	1.8	0.1	0.1	1.9	0.1	0.1	2.1
Waste burning:												
Agricultural and range	1.0	0.5	0.1	1.0	0.5	0.1	1.1	0.5	0.1	1.1	0.5	0.1
Other	4.2	2.2	0.0	4.6	2.4	0.0	4.9	2.6	0.0	5.3	2.8	0.0
TOTAL STATIONARY SOURCES	24.3	17.4	48.2	27.4	19.6	59.7	30.9	21.9	72.5	33.7	23.5	65.4
MISCELLANEOUS AREA SOURCES	1.7	1.1	0.0	1.8	1.2	0.0	1.9	1.3	0.0	2.1	1.4	0.0
Motor vehicles-on-road	36.2	33.3	27.6	23.9	22.2	26.5	21.2	19.5	28.6	21.7	20.1	31.6
Trains and off-road vehicles	4.0	3.7	8.2	4.4	4.0	9.0	4.6	4.3	9.5	5.0	4.6	10.3
Aircraft	8.7	7.4	0.5	8.5	7.2	0.5	8.1	6.9	0.5	7.6	6.5	0.5
TOTAL MOBILE SOURCES	48.9	44.1	36.3	36.8	33.4	36.0	33.9	30.7	38.6	34.3	31.2	42.4
TOTAL EMISSIONS	74.9	62.6	84.5	66.0	54.2	95.7	66.7	53.9	111.1	70.1	56.1	107.8
Percent of emissions from:												
Stationary sources	32.4	27.8	57.0	41.5	36.2	62.4	46.3	40.6	65.3	48.1	41.9	60.7
Miscellaneous area sources	2.3	1.8	0.0	2.7	2.2	0.0	2.8	2.4	0.0	3.0	2.5	0.0
Mobile sources	65.3	70.4	43.0	55.8	61.6	37.6	50.8	57.0	34.7	48.9	55.6	39.3

NOTES AND SOURCES:

THC	Total hydrocarbons
RHC	Reactive hydrocarbons (ARB reactivity Classes II and III)
NO$_x$	Oxides of nitrogen

Except for power plants, motor vehicles, and aircraft, emissions projections are based on 1974 average daily emissions (Table III of Appendix A-7)* times the appropriate growth factor listed in Table 52.

Power plant THC and NO$_x$ emissions based on the following annual power generation assumptions (see Exhibit C, Appendix A-5):

1980	8 million megawatt-hours (44 percent capacity factor)
1985	10 million megawatt-hours (55 percent capacity factor)
1990	12 million megawatt-hours (66 percent capacity factor)
1995	9 million megawatt-hours (70 percent capacity factor following retirement of 582 megawatts of capacity in 1992 as projected in California Energy Resources and Development Commission, 1976)

Fuel oil assumed to be the exclusive fuel (Exhibit C, Appendix A-5). THC and NO$_x$ emission factors from California Air Resources Board, 1976b (Exhibit 1 of Appendix A-7). Hydrocarbon reactivity factor from Appendix A-6.

Motor vehicle emissions based on adjusted MCTS VMT projections (Table 51) and VMT-weighted, class-composite vehicle emission factors for Monterey County (Table V of Appendix A-7).

Aircraft emissions based on estimates of daily aircraft landings and takeoffs (Exhibit 2 of Appendix A-7) and aircraft-type emission factors (Exhibit 3 of Appendix A-7).

* All "A" appendices are in Volume II of the Final EIS/EIR.

Table 54

PROJECTED MAX-HOUR OXIDANT AND NO2 POTENTIALS UNDER E-0/D-100 COMPOSITE POPULATION FORECAST CONDITIONS

VMT Forecast Basis	Parameter	Forecast Year 1974	1980	1985	1990	1995
		OXIDANT				
Adjusted MCTS Data	Vehicle RHC	52.0	33.3	22.2	19.5	20.1
	Total RHC	77.5	62.6	54.2	53.9	56.1
	Ox @ B=0	0.112	0.090	0.078	0.078	0.081
	Ox @ B=0.005	0.112	0.091	0.080	0.079	0.082
	Ox @ B=0.01	0.112	0.092	0.081	0.081	0.084
Adjusted ARB-DMV Data	Vehicle RHC	36.2	22.9	15.2	13.3	13.5
	Total RHC	61.7	52.2	47.2	47.7	49.5
	Ox @ B=0	0.112	0.095	0.086	0.087	0.090
	Ox @ B=0.005	0.112	0.096	0.087	0.088	0.091
	Ox @ B=0.01	0.112	0.096	0.088	0.089	0.092
		NITROGEN DIOXIDE				
Adjusted MCTS Data	Vehicle NO_x	29.5	27.6	26.5	28.6	31.6
	Total NO_x	66.9	84.5	95.7	111.1	107.8
	NO_2 @ B=0.004	0.15	0.188	0.213	0.246	0.239
Adjusted ARB-DMV Data	Vehicle NO_x	20.5	19.0	18.2	19.5	21.3
	Total NO_x	57.9	75.9	87.4	102.0	97.5
	NO_2 @ B=0.004	0.15	0.195	0.224	0.261	0.250

NOTES AND SOURCES:

VMT data sources discussed in Draft EIS (page 297 and Appendix A-7).* Values used are presented in Table 51.

RHC = Reactive hydrocarbon emissions (tons per day). Motor vehicle RHC emissions based on VMT levels in Table 51 and VMT-weighted composite emission factors in Table V of Appendix A-7. RHC emissions for other source categories are given in Table .

Ox = Ambient oxidant level in parts per million (ppm) by volume. 1974 oxidant level from Appendix A-4, corrected by 0.8 factor (see Appendix A-2). One-hour oxidant air quality standards are 0.08 ppm (federal) and 0.10 (California).

NO_x = Oxides of nitrogen emissions (tons per day). Motor vehicle NO_x emissions based on VMT levels in Table 51 and VMT-weighted, composite emission factors in Table V of Appendix A-7. NO_x emissions for other source categories are given in Table 53.

NO_2 = Ambient nitrogen dioxide level in parts per million (ppm) by volume. 1974 NO_2 level from Appendix A-4. California 1-hour NO_2 standard = 0.25 ppm.

Potential air quality levels projected by the unmodified "rollback" technique (see pages 297-299 of Draft EIS):

$$AQ_{fy} = B + (AQ_{by} - B) \times \frac{E_{fy}}{E_{by}}$$

Where: AQ = Ambient air quality (ppm)
B = Natural background air quality level
E = Emissions of precursor pollutant
by = Base year = 1974
fy = Forecast year

* All "A" appendices are in Volume II of Final EIS/EIR.

produce the remaining RHC reduction which appears necessary to attain federal oxidant standards by 1980. This whole issue will be reevaluated in detail in the preparation of an Air Quality Maintenance Plan if Monterey and Santa Cruz Counties are designated as an AQMA.

Indirect Traffic Impacts of Growth

Traffic Impacts Associated with Area Growth. This issue is addressed by the Monterey County Transportation Plan. The latest revision of that plan (California Department of Transportation, 1977) is based on a county population level of 411,388 in 1995 (an increase of 19,348 over the 1995 population level used in the 1976 version of the plan). This population level is very similar to that used in the Draft EIS/EIR and Draft Facilities Plan (see corrected Table 46 in the EIS/EIR Addendum). The decision to reduce the sizing of the regional treatment plant implies a 1995 county population of about 363,827.

The following tables summarize the traffic impacts identified in the county transportation plan, and the transportation system improvements recommended by that plan.

Archeology

In the process of conducting an archeological field survey of the project's alternative treatment plant sites and pipeline routes, one possible archeological site (JS-MP-1) was discovered in the vicinity of the Seaside wastewater treatment plant. As indicated on pages 190 and 191 of the Draft EIS/EIR, this possible site is not within the proposed pipeline route that runs along the Highway 1 frontage road in the vicinity of the Seaside plant. Only if the interceptor alignment was moved seaward would the site be possibly affected, and this change in route is not planned. Therefore, the project will have no known effect on properties included or eligible for inclusion in the National Register of Historic Places. It is not felt that implementation of the protection procedures identified in 36 CFR, Part 800 is necessary at this time. A letter from the project's archeological consultant stating similar views is included in the Final EIS/EIR Volume I appendix.

Table 55

CURRENT AND PROJECTED TRAFFIC FLOWS

Highway Segment or Multi-Route Corridor	1976 Average Daily Traffic	Projected 1995 Average Daily Traffic
Highway 1		
At Moss Landing	18,000	29,000
At Marina	30,000	48,000
Highway 1-Del Monte-Fremont Corridor		
In Seaside, north of Route 218	83,000	97,000
Highway 1-Fremont Corridor		
Between Pacific and Fremont Streets	74,000	91,000
Highway 1		
South of Seventeen Mile Drive	41,000	59,000
Route 68		
South of Monterey Peninsula Airport	11,000	36,000
East of Laureles Grade Road	14,000	31,000
Route 218		
North of Route 68	5,000	23,000
Route 101-Abbott Corridor		
At Harris Road	22,000	31,000
Route 101-North Main Corridor		
South of Espinosa Road	52,000	85,000
Route 101		
South of Route 156	26,000	52,000
Route 156		
Between Routes 183 and 101	14,000	25,000
Route 183		
South of Espinosa Road	10,000	19,000
West Blanco Road		
West of West Alisal Road	8,000	25,000
West of Cooper Road	9,000	20,000

Source: California Department of Transportation, 1977. Monterey County Transportation Plan. Page A-74.

Table 56

MONTEREY COUNTY TRANSPORTATION PLAN
RECOMMENDED PLAN, ACCIDENT STATISTICS

State Highways[1]

Route	Existing Facility	Planned Facility	1971-1973 Acc./MVM[2]	Statewide Average For Similar Facilities Acc./MVM	Adopted Plan 1995 Expected Acc./MVM[3]
1	2C	2C	3.28	2.60	2.60
1	2C,4F	4F	3.01	2.08	1.20
25	2C	2C	3.64	2.60	2.60
68	2C	2C	5.30	5.30	5.39
68	2C,4E,4F	4E	4.06	2.60	1.65
101	4E,4F	4F	1.43	0.95	0.58
146	2C	2C	2.23	2.60	2.60
156	2C	4E	2.10	2.60	1.65
183	2C	4E	5.48	2.60	2.63
198	2C	2C	5.51	2.60	2.60

[1] Data for city streets and county roads not currently available.

[2] MVM - Million vehicle miles of travel.

[3] Forecast using current Caltrans methods.

[4] Highest rate indicated.

2C - two-lane conventional highway.
4F - four-lane freeway.
4E - four-lane expressway.

MONTEREY COUNTY TRANSPORTATION PLAN - SUMMARY OF RECOMMENDED PLAN MAJOR IMPROVEMENTS, 1977-1995

Highway Element

State Highways

Route 1, Castroville to Pajaro River, freeway construction.
Route 1, Hatton Canyon Freeway, freeway construction.
Route 1, Carmel Hill (Rte. 68 jct.) to Ord Interchange, major widening.
Route 68, Toreador Road to Reservation Road, freeway construction.
Route 68, Route 1 to Toreador Road, freeway construction.
Route 68, Blanco Road to Route 101, construct portion of Salinas bypass.
Route 101, Arroyo Seco to Gonzales, reconstruct portions (structural section).
Route 101, Boronda Road to San Benito County Line, freeway construction.
Route 101, Airport Boulevard to Boronda Road, major widening.
Route 156, Castroville to old Route 101, major widening.
Route 156, Old Route 101 to new Route 101, construct 2-lane expressway.

Route 183, Salinas to Castroville, major widening.

County Roads

Old Stage Road, Williams Road to Natividad Road, reconstruction.
Elkhorn Road, Strawberry Road to Walker Valley Road, reconstruction.
Blanco Road, Alisal Street to Davis Road, 4-lane reconstruction.
Blanco Road, Davis Road to Cooper Road, 2-lane reconstruction.
Blanco Road, Reservation Road to Davis Road, 4-lane reconstruction.
Carmel Valley Road, Via Petra to Valley Greens Drive, reconstruction.
Metz Road, Airport Road to Spreckels Road, reconstruction.
Nacimiento Lake Drive, Jolon Road to four miles south, reconstruction.
Hebert Road, San Juan Grade Road to new Route 101, new roadway.
Hunter Lane, Route 68 to Harkins Road, reconstruction.

City Streets

North-South Road, extend to California Avenue in Marina, new construction.
California Avenue, extend to meet new North-South Road, new construction.
Reservation Road, Salinas Street to Crescent Avenue, reconstruct and channelize.
Del Monte Avenue, Meyers Street to Washington Street, widen.
Fremont Street, Route 218 to Route 68, signalize and channelize.

City Streets (cont'd.)

David Avenue (Mon.), Lyndon Street to Hawthorne Street, widen.
Hawthorne-Van Buren Connection, construct new street (Monterey).
Front Street (Sal.), Construct railroad grade separation.
Romie Lane (Sal.), South Main Street to Alameda Street, reconstruct.
West Alisal Street (Sal.), Cayuga Street to College Drive, widen.
Clark Street Extension (Sal.), Market Street to Laurel Drive, new street construction.
Carneros Street Extension (Sal.), North Main to Clark Street extension, new street construction.
John Street (Sal.), Construct railroad grade separation.

Transit Element (Bus Transportation)

Local Service

Monterey Peninsula, expanded service and reduced headways.
Salinas, expanded service and reduced headways.
Gonzales, Soledad, Greenfield, King City, Prunedale area, Pajaro area, future local service.

Inter-City or Inter-Area Service

Monterey-Salinas via Route 68.
Monterey-Carmel Valley.
Monterey-Pajaro, Watsonville.

Salinas-South County.

Air Element

Monterey Peninsula Airport District*

Runway Extension, extend runway 10/28 one thousand feet east and acquire clear zone.
General Aviation Runway, construct new runway parallel to 10/28.
Fire Station, construct fire station.
Hangar Facilities, construct hangar facilities on north side.
Resurfacing, resurface and repair runways and taxiways.
Approach Aid, improve approach aid system.
Safety Lighting, improve safety lighting system.
Terminal Expansion, expand terminal facility.

*Assumes adoption of draft master plan now being considered.

Salinas Airport

Taxiway Lights.
Parking Ramp Extension.
Storm Drain Improvements.

King City Airport (Mesa Del Rey)

Building Construction, construct hangars, maintenance building and an administration building.
Other Improvements, improve drainage, apron areas, runways, taxiways, fencing and add new tie down facilities.

Rail Element

Rail Freight

No major changes. Southern Pacific Transportation Company will continue to provide service.

Passenger Service

Feasibility analysis related to restoration of Del Monte service is in progress.

Water Element

Moss Landing Harbor District

Berth Construction, construct new berths.

Develop Turning Basin.
Construct Restrooms, Sewage Facilities, Parking and Launching Ramp.
Expand Salinas River Channel.

City of Monterey Harbor

Construct Boat Mooring Facility and Launching Facility.
Wall and Slip Replacement.

Non-Motorized Element

This element involves development of bicycle, pedestrian and equestrian facilities in various jurisdictions. Some of the projects are:

Construct bridge on Junipero Serra Trail (hiking path), north of Carmel Mission.
Route 1 from Carpenter Street to Soledad Street. Construct bike path, sign and stripe.
Southern Pacific-Monterey Peninsula Recreation Trail (Monterey and Pacific Grove). Negotiate with Southern Pacific Transportation Company for purchase or lease of railroad right-of-way for non-motorized use.
Oceanview Boulevard Bikeway (Pacific Grove), develop bikeway between David Avenue and Asilomar.
Develop Roberts Lake and Laguna Grande Park Bike Paths (Seaside).

Pipeline Element

Major pipelines in the county are owned by Pacific Gas and Electric Company, Mobil Oil Company and the California American Water Company. Little detailed information is available regarding improvements. The California-American Water Company has future plans for a 30-inch water line from the Carmel Valley to the Seaside area.

Plan Analysis

As noted earlier the Plan is a systems plan dealing primarily with issues of countywide and statewide significance. It addresses transportation needs for the next 18-year period, 1977-1995.

The Plan is based on a single land use plan which reflects the land use plans of individual jurisdictions. All socio-economic forecasts were made by the planning staffs of each jurisdiction based on their land use plans. Alternative land use scenarios will be evaluated in future years.

The Plan should reasonably meet the 18-year transportation needs of the county. In some cases the Plan does not fully meet forecasted needs. There are several options available to us. We can accept a lower level of service on our highways (level of service D or E) and the delay, congestion and accidents related to it. We can expand the facilities. We can try to serve more trips by public transportation, car or van-pooling, bicycling or walking. Or, we can alter our land use plans and guide growth in a manner which will eliminate the need for more facilities than the Plan currently provides. These options will be more fully evaluated as the Plan is updated in future years.

Some of the system facilities referred to in the Plan have not been designed or located on the ground. In the capital programs included in this report the anticipated type of facility is indicated. For example, in the Route 68 corridor between the Monterey Peninsula area and Salinas forecasts indicate that major transportation improvements will be needed. The capital program indicates construction of a freeway facility. As noted above, other options are available such as improved transit, upgrading and developing the local road system, expanding the existing state highway and limiting growth to levels below those forecasted. Subsequent more detailed plans will be developed before implementation of individual projects. These detailed plans will specify the character and capacity of the planned facilities or services.

Planning activities on the Monterey Peninsula are presently involved with three proposals which will have significant transportation impacts. They are the Monterey II Plan, the Del Monte Forest Plan 1977 and the Monterey Peninsula Airport Master Plan. It is essential that transportation planning related to these proposals be closely coordinated with the overall transportation planning process. Transportation impacts, costs and mitigation measures related to each proposal should be fully evaluated before the plans are implemented.

It is anticipated that studies to assess, in greater detail, the transportation impacts of these and other proposals will be directed at the Route 68 corridor from Route 1 to Reservation Road, the Canada de la Segunda corridor and the Route 68 corridor between Pacific Grove and Route 1 in the near future.

As a future consideration, a feasibility study to determine the need for and if appropriate possible location for a new commercial airport facility might be desirable.

An underwater archeological survey of the outfall alignment has not been conducted to date, as a specific route and length have not been officially determined. Once the outfall's length and general location have been ascertained, a route will be surveyed and an archeological investigation will be conducted. These steps will occur in the facilities design stage.

Water Supply

Reusing reclaimed wastewater in the Castroville area for food crop irrigation would provide a water supply benefit to farmers and residents of the lower Salinas Valley, primarily those in or near Castroville. This reuse would not alleviate water supply shortages in the Monterey Peninsula area. This situation is discussed on pages 246 and 247 of the Draft EIS/EIR. However, neither of the reclamation alternatives being given serious consideration (134 and 166) preclude eventual local reclamation projects should they become more desirable or more feasible in the future. Golf course irrigation, both on the peninsula and at Ft. Ord, is currently being studied in depth.

The water-demand figures presented in Table 19 (Page 108) of the Draft EIS/EIR were developed assuming past rates of consumption and include populations within the entire study area. The demand includes both residential and commercial uses of water. The current water shortage on the Monterey Peninsula has resulted in significant reductions in consumption by those persons served by the California-American Water Company (Carmel, Pebble Beach, Pacific Grove, Monterey, Seaside, Del Rey Oaks, Sand City), but has not affected consumption in the remainder of the study area. Data compiled by California-American Water Company indicates consumption by their 100,000 customers has been reduced 54 percent since a mandatory water rationing plan was initiated on February 18, 1977. This reduction was calculated by comparing total water use in the February to June period of 1976 with total use for the same period this year. The reduction so far totals over 3,300 acre-feet (Sullivan, pers. comm.).

It must be pointed out, however, that the water rationing program is only temporary and will probably be eliminated as soon as drought conditions pass. In addition, only 65 percent of California-American Water Company's water sales are to residential hook-ups. Finally, only about one half of Monterey area residential water consumption occurs indoors, thereby contributing flow to the wastewater system. This indicates that it would be both difficult and of only marginal value to calculate what the temporary reduction in residential water demand could mean in terms of changes in wastewater treatment system sizing.

Fish, Wildlife and Vegetation

Rare and Endangered Plants

As indicated on page 321 of the Draft EIS/EIR, three of the project's alternative interceptor segments pass through or near areas mapped as rare plant habitat by the California Native Plant Society. Two of the routes (A1 and B1) are planned as part of the recommended system. Construction of these interceptors is planned to occur in the shoulder of or immediately adjacent to existing rights-of-way. If the construction impact zone extends beyond the existing disturbed right-of-way in the areas where rare plants have been mapped, an on-foot field survey of the routes will be conducted by a qualified plant expert to determine if indeed rare plants are present. This should ensure that a significant loss of plants does not occur.

Marine Fauna

Since publication of the Draft EIS/EIR, additional marine faunal sampling has been conducted in the vicinity of the proposed outfall by Engineering Science, Inc. This predischarge survey work is an ongoing study required by the State Water Resources Control Board. The first samples were taken in January of 1977; additional sampling occurred in March. The results of these surveys have been reported in statistical form in *Oceanographic Investigations in Central Monterey Bay - Survey Activities January-March 1977* (Engineering Science, Inc., 1977). A narrative analysis of the results has not yet been prepared. Due to the volume of the sampling information and the present lack of an analysis, this material has not been included herein. Interested persons are referred to the document cited above if additional data are desired. (The report is available in the office of Engineering Science, Inc., in Berkeley and the Monterey Peninsula Water Pollution Control Agency in Monterey). The predischarge surveying will continue for the remainder of the year; the detailed marine faunal data compiled will be used as a baseline for identification of changes near the ocean outfall once it is in operation. A map of the predischarge sampling stations is presented on the following page.

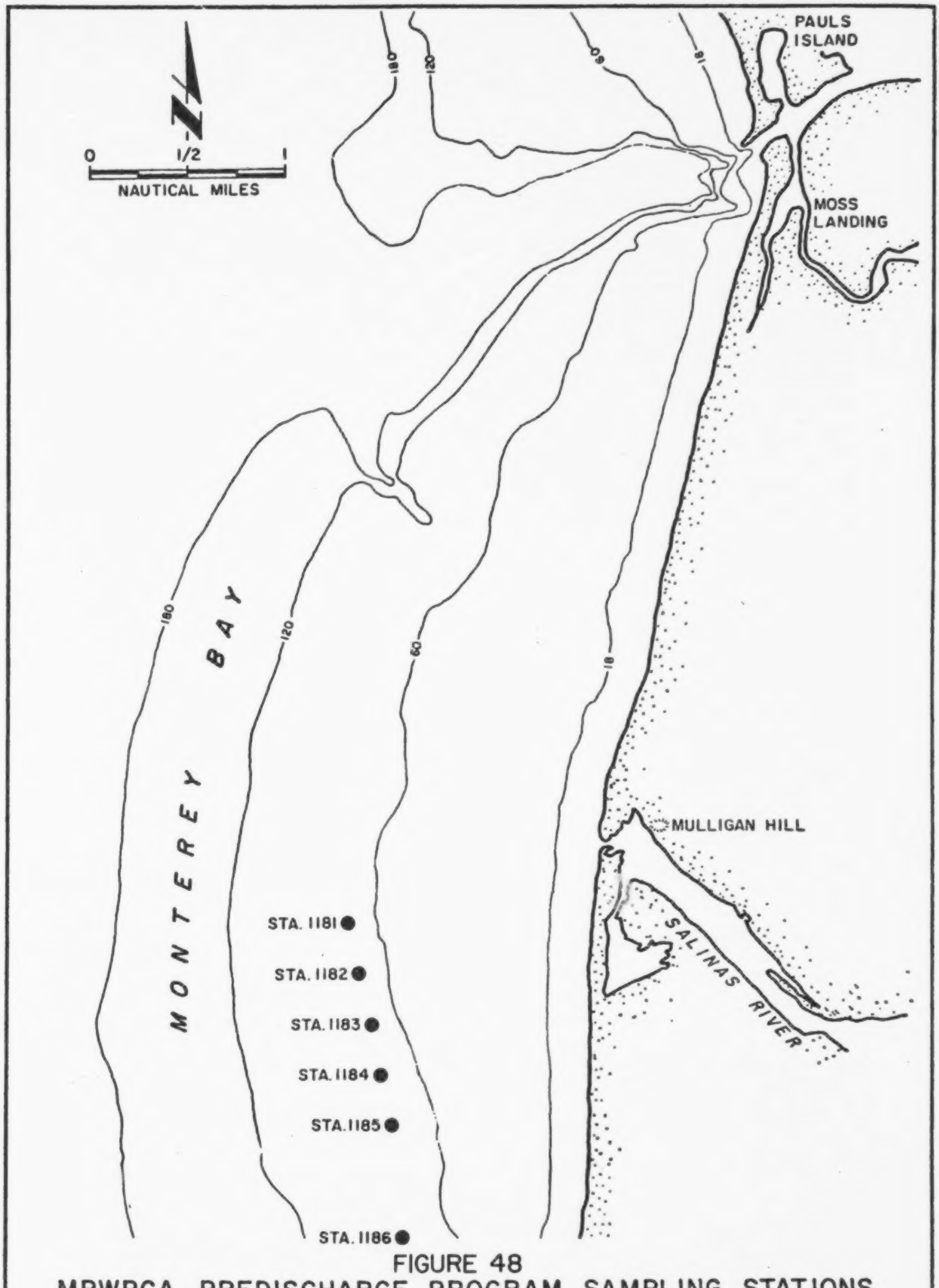
PAULS ISLAND
MOSS LANDING
MULLIGAN HILL
SALINAS RIVER
MONTEREY BAY
0
1/2
1
NAUTICAL MILES
180
120
60
18
STA. 1181
STA. 1182
STA. 1183
STA. 1184
STA. 1185
STA. 1186

FIGURE 48
MPWPCA PREDISCHARGE PROGRAM SAMPLING STATIONS

Source: Engineering Science, Inc, 1977

Estuarine and Aquatic Resources of the Salinas River Lagoon

Page 99 of the Draft EIS/EIR indicates there is an apparent lack of published information on Salinas River Lagoon fauna. The scope of this report's preparation did not include detailed field surveying of estuarine invertebrates, fish and avian populations in the study area. Existing reports have been the major data source. Additional inquiries, since publication of the Draft EIS/EIR, have located two additional species lists for the lagoon area. One list describes the plants found within the wildlife management area and the second list provides a detailed picture of avifauna utilizing the lagoon area. These lists are attached as additional background data for the EIS/EIR (Volume I appendix). Recent inquiries have not turned up additional information on benthic species or fish found in the lagoon. The only fish sampling information found to date was included as Table H-3 in the Draft EIS/EIR appendices (see Volume II). The project's probable impacts on vegetation and wildlife resources in the Salinas River lagoon area are described on pages 236-243 of the Draft EIS/EIR.

Groundwater

Quantity

The growth-related impacts of the proposed project on groundwater supplies are discussed on pages 291 and 292 of the Draft EIS/EIR. The discussion indicates that continued population growth in the Salinas Valley will lead to increased draws on the groundwater basin. Efforts were not made to quantify the additional overdraft or compare it to the reclaimed water source provided to the area by the regional wastewater treatment facility. Recent action aimed at limiting population growth in the service area to mitigate air quality impacts has cut back the allowable size of the regional wastewater treatment plant from the design population level to the E-0 level. The E-0 treatment plant would accommodate an additional 20,943 persons in the Salinas-Castroville-Prunedale area by 1990. If these new residents draw groundwater at existing user rates in those areas, an additional 4,150 acre-feet of water would be withdrawn from the underground basins (290 in the Castroville-Prunedale area and 3,860 in the Salinas area). If mandatory or voluntary water conservation measures were to reduce per capita residential consumption over the next 13 years, this added drawdown would obviously be smaller.

In comparison, if one of the seasonal reclamation alternatives (134 and 166) are implemented, up to 14,200 acre-feet per year (1990) of wastewater will be used for irrigation in the Castroville area, eliminating the need for a similar amount of groundwater pumping. Therefore, even if the new wastewater system supports E-0 growth in the service area through 1990, the project as planned would represent a net benefit to the water supply situation in the Salinas Valley.

Quality

Work on the Draft EIS/EIR did not include a detailed searching of all well logs in the study area to determine specifically where each domestic water supply well is located. Pages 200 to 203 of the Draft discuss in general terms the likelihood of the project affecting widely used groundwater aquifers. In the proposed irrigation reuse area (around Castroville), it is likely that only the surface aquifer would be affected, and this water source is already of poor quality and little used for domestic supply. The agricultural irrigation demonstration project now in progress will be analyzing the possibility of domestic source contamination in detail prior to implementing a large-scale irrigation scheme.

The possibility of groundwater contamination from surface or subsurface storage (Alternatives 170 and 171) does not warrant more detailed analysis, as these options are not part of the recommended project. The likelihood of contamination from sludge disposal at the landfill site is to be avoided by using sand-drying beds dewatering with leachate collection prior to deposition in the active landfill site. This method is in compliance with the regulations of the State Solid Waste Management Board that are designed to protect groundwater resources from leachate contamination.

Landfill Operation

As currently planned, the regional wastewater treatment facility would occupy up to 50 acres of uncommitted open space owned by the Monterey Peninsula Garbage and Refuse Disposal District near the Marina landfill. It would not reduce the planned design lifetime of the landfill and would not interfere with its operation. The specific mechanism to be used to acquire the site for the wastewater agency has not yet been determined. Some type of contractual agreement or land sale will undoubtedly be made between the Refuse Disposal District and the new regional sanitation district. No official estimates of probable land cost have been made to date.

Ocean Outfall

Location and Design

Current plans indicate the ocean outfall of Alternative 166 would enter Monterey Bay slightly more than a mile south of the mouth of the Salinas River and would extend 1950 meters (approximately 6,400 feet) out into the bay. It would angle at 105° from true North (west-southwest) and would have a total diffuser length of 275 meters (900 feet). Ocean depth at the end of the diffuser would be 22 meters (72 feet; Engineering Science, Inc., 1976).

Statistical analysis of the bay's density profile and ocean currents, combined with the anticipated design performance of the outfall shows that effluent dispersal would meet the State Ocean Plan's 50 percentile standard of 100 to 1. However, conditions are not sufficient to meet the Plan's 80 to 1 dilution requirement 90 percent of the time. While final resolution of this inconsistency has not yet been obtained, the Central Coastal Regional Water Quality Control Board and the State Water Resources Control Board presently feel minor modifications can be made to bring the outfall's performance up to acceptable limits (Waters, pers. comm.).

Impact on Marine Biota, Public Health

The statistical analysis of the outfall's performance mentioned above also included specific public health factors. An analysis was conducted to insure that present bacterial standards for the bay shoreline's beneficial uses could be met by the outfall's location and design. Engineering Science, Inc.'s calculations indicate the midpoint of the outfall diffuser would have to be 1820 meters offshore to meet both the 1000 MPN/100 ml bacterial standard for bathing and the 230 MPN/100 ml standard for shellfishing within the shore's protected area (all waters within 1000 feet of shoreline or landward of the 30-foot depth contour, whichever is greater). The midpoint of the planned outfall is approximately 1820 meters offshore and should therefore be capable of protecting body contact recreation and shellfishing uses of the Monterey Bay shoreline.

Impacts of the proposed outfall on marine biota were discussed on pages 243-245 of the Draft EIS/EIR. Since publication of the Draft, additional biological and physical oceanographic data collected near the proposed outfall location have been presented in an oceanographic report (Engineering Science, Inc., 1977). While the data appear to meet the SWRCB's predesign study specifications, the lack of any summary or capsul analysis and the short time period over which monitoring has occurred make analysis and discussion beyond that included in the Draft of little value. It also seems unfortunate that the scientists who performed the analyses were not identified. Statistical analyses of the data may have some value after several years of data collection, but the methods of data compilation and presentation shown in the report do not facilitate identification of outfall-induced as opposed to naturally-occurring changes in populations. When the question is asked, what can be inferred from the data given in the report about possible risk from the outfall, one only wonders about what the numbers are supposed to mean and to what uses they may be put. To what use can one put a statistical index made up of the components on sample 1182-1.1 (9 shrimps, 1 crab, 1 snail and 1 squid)? More natural history-type narrative descriptions of the meaning of the data rather than the statistics would greatly enhance their usability.

The baseline data compiled to date have identified no major variation in bottom conditions or benthic and demersal communities within the ocean study area. It is considered unlikely that the proposed discharge will have any major discernible effect on the existing marine communities. Localized changes in the distribution and density of both benthic and demersal species can be expected, but the overall character of central Monterey Bay biota should not be significantly altered. With some modification of the present sampling procedures and method of reporting data, the information generated in the continuing pre-discharge monitoring program could shed more light on the nature and variability of the discharge area's marine biota. This will enhance the chances that post-discharge monitoring will identify discharge-induced changes in the marine environment.

Seasonal changes in discharge volumes should have no significant effect on biota along the outfall diffuser. During periods of non-use, the diffuser ports may fill with sand unless covered, but it is unlikely that benthic organisms will clog the ports. These animals are attracted by the currents generated during waste discharge; lack of flows through the ports will discourage the accumulation of most benthic species.

Wastewater Storage

Underground Storage

The only project alternative that proposed underground storage of treated wastewater was #171. Because this alternative is not being recommended for implementation at this time, a detailed geohydrologic investigation of the rolling terrain north of Marina will not be made. No cost estimates for such a study have been requested or received. The recommended project (Alternative 166) does not preclude use of underground storage in the future should a market for the entire year's supply of wastewater be found. A geohydrologic investigation of the proposed storage site would be in order once the decision was made that total reclamation was feasible.

Surface Storage

Alternative 170 requires approximately 9,000 acre-feet of surface storage capacity to accommodate wastewater flows into the treatment plant during non-irrigation periods. This storage is not necessitated by algae production that might occur in tertiary-treated effluent, it is simply needed to accumulate off-season wastewater flows. Tertiary treatment is planned after, rather than before, storage to ensure the highest possible quality of irrigation water and to avoid fouling of irrigation distribution pipelines and sprinklers.

Food Crop Irrigation

Title 22, Division 4 of the California Administrative Code allows for sprinkler irrigation of food crops with reclaimed wastewater if that water is at all times adequately disinfected, oxidized, coagulated, clarified and filtered. The California Department of Health has established these treatment requirements in order to protect the public health. Whereas, at the present state of science and technology, there can be no absolute assurance that this level of treatment would preclude any adverse effect on public health, the State Department of Health has deemed this treatment as adequate protection.

Because local controversy has developed over the use of wastewater on local crops that go to market and are frequently consumed without processing of any kind, a 5-year agricultural irrigation demonstration project has been initiated in the Castroville area. This pilot project will analyze in detail all potential health threats that might be created by use of wastewater that meets Title 22 treatment requirements. Both state and county health departments are actively participating in this demonstration project. Irrigation reuse of the proposed project's wastewater will not be implemented until the results of the demonstration are known and adequate protection of public health is assured.

The agricultural demonstration project will also be considering the effects of wastewater irrigation on local surface and groundwater supplies. Changes in the quality of both surface runoff and leachate will be monitored so that possible degradation of existing water supplies can be assessed. As stated above, the results of this demonstration project will be analyzed thoroughly before any full-scale reclamation project is implemented as part of the regional 201 wastewater management project. While the federally-funded 208 planning effort in the area will be considering the water quality implications of agricultural runoff, it will not specifically analyze the potential effects of irrigation with reclaimed wastewater, and it will not deal with agricultural runoff in the Salinas Valley. Its efforts will be concentrated on problems in the Pajaro Valley. While the wastewater irrigation plans of the 201 project could in general be considered in conflict with the water quality mandates of 208 planning, it is not expected that wastewater irrigation would be implemented if the demonstration project proved that serious surface or groundwater degradation would occur.

River Disposal

Decisions reached since review of all questions and comments on the Draft EIS/EIR make objections to the river disposal alternative (#134) moot. It has been decided that Alternative 166 is the most cost-effective approach to eliminating water quality problems in the study area. While both accurate and inaccurate objections were raised regarding a river discharge, the ultimate reasons for abandoning this option were its high cost, questionable public health implications, and inability to be staged. The full impact of Alternative 134 on the Salinas River lagoon and its flora and fauna is still undetermined. A further discussion of unresolved issues is presented in the Final EIS/EIR summary.

Castroville Irrigation Project

The Castroville Irrigation Project (CIP) was developed by the Monterey County Flood Control and Water Conservation District (MCFCWCD) as a means to provide an alternative high-quality, freshwater source to 9,100 acres of cropland in the Castroville area. The area is currently affected by seawater intrusion into the groundwater aquifer used for domestic and agricultural water. A loan to implement this project has been requested from the U. S. Bureau of Reclamation. A project report and environmental impact statement were published in 1974. Since that time the CIP has been inactive. The County Board of Supervisors, who must okay the project, have delayed action pending study of alternative water supplies (primarily the so-called "900-foot aquifer" thought to exist below the lower Salinas Valley). No date for resumption of the project has been developed, and its viability remains questionable.

Costs developed for wastewater-project Alternatives 134, 166, 170 and 171 did not include construction of an irrigation distribution system; it was assumed that hooking into the CIP system would preclude this need. If the CIP were not constructed prior to implementation of one of the wastewater reclamation projects, it would be necessary to develop an independent irrigation distribution system. It is not presently clear who would fund this independent system -- the state, the federal government, the regional wastewater management agency, the farmers, or some combination of these entities. The CIP project report (Monterey County Flood Control and Water Conservation District, 1974) indicated that the irrigation distribution stations and pipelines would cost over $1,600,000; the total CIP cost was estimated at $8,037,000.

If food crop irrigation with reclaimed wastewater eventually proves to be feasible, the additional supply of irrigation water it could provide to the Castroville area could eliminate the need for a new well field proposed as part of the CIP. The reclaimed water source, fed directly into the CIP distribution system, would therefore represent a construction cost savings of approximately $471,000 to the CIP (Engineering Science, Inc., 1976a).

For a full discussion of the economic and environmental implications of the Castroville Irrigation Project, reference is made to the project EIS-Draft Environmental Impact Statement-Castroville Irrigation Project, prepared in 1974 by Monterey County Surveyors, Inc. and Koretsky-King Associates for the MCFCWCD.

Fort Ord Participation

The U. S. Army installation at Fort Ord currently operates its own secondary treatment plant and discharges wastewater to Monterey Bay at Indian Head Beach. In order to comply with the treatment requirements of PL 92-500 and the mandate of the Regional Water Quality Control Board at the earliest possible date the Army has embarked on its own facilities planning effort and is proposing to construct a land disposal system on Fort Ord property. Even though the regional facilities planning project has proceeded under the assumption that Fort Ord will eventually participate in the system, this remains questionable at present. The Army is reluctant to forego development of their own system in favor of a regional tie-in due to the lengthy time frame of regional system completion and the immediacy of correcting their current disposal procedure.

In the first week of August, 1977, the U. S. Army Forces command was informed that in EPA's opinion Fort Ord should proceed with their plans to reclaim wastewater for irrigation of the Fort's main gate landscaping and golf course. However, it was recommended that they not proceed with plans for land disposal of effluent near Fritzsche Airfield; it was suggested that this portion of the effluent be disposed of through the proposed regional wastewater system.

Marina Participation

Questions were raised both at the public hearing and in written form about the desirability of the Marina County Water District (MCWD) participating in the planned regional wastewater system. MCWD has not been a member of the MPWPCA joint powers agreement which has promoted the regional project, but they have actively participated in the project's Technical Advisory Committee meetings. An independent engineering feasibility study conducted for MCWD by George S. Nolte & Associates was submitted into the public hearing record as an indication of other wastewater treatment and disposal options that MCWD could implement at less cost than participating in the regional system.

The MCWD engineering report has subsequently been reviewed by the State Water Resources Control Board and questions have been raised concerning the present worth analyses included in the document. Two letters have been sent by the SWRCB to MCWD taking exception to the report's findings. The second letter indicates that Marina's full participation in the regional wastewater system is considered the most cost-effective wastewater management option by the SWRCB, and therefore state funding will be available for this option only. The two SWRCB letters are included in the Volume I appendix.

Growth

Inducement/Accommodation

The EIS/EIR (pp. 258-259) cites the financial plan for the project developed by Bartle-Wells in reporting that the project would be administered by a regional county sanitation district which would finance the proposed project by means of user charges, both monthly service charges and connection fees. The Monterey Regional County Sanitation District has since been formed. As the project will not be funded through property taxes, project funding is not anticipated to have an impact on land values or affect existing pressures for development of undeveloped land by altering current landowner's costs of ownership.

If the proposed project removed existing constraints to growth in parts of the study area, it would be viewed as growth-accommodating. Major wastewater treatment constraints to growth in certain local areas appear to be surmountable even if the project is not built.

The only wastewater treatment-related building ban in effect in the north county is in Moss Landing, where a separate wastewater treatment project is being pursued. In other portions of the study area, limitations on developability arising from wastewater treatment and disposal conditions are of two types: capability of the soils to support septic tanks and capability of new development to provide centralized on-site systems (package plants). In the first case, the soil capability problem may result in larger residential parcels (lower density) than would otherwise exist; recent rezoning in the north county has decreased potential densities, perhaps in part as a response to soils conditions. In the second case, package plants have not been prohibited by the Regional Water Quality Control Board (see discussion in the EIS/EIR pp. 285-286). A number of existing higher density developments in both the Castroville-Prunedale corridor (such as Oak Hills) and in the Monterey-Salinas corridor (Laguna Seca, Toro

Estates, Corral de Tierra) are served or are planned to be served by package plants. Because these on-site alternatives are available, the proposed regional plant has not been judged to be growth-accommodating.

The project is not expected to significantly affect the spatial distribution of growth in the study area. It is the established policy of the Board of the Monterey Regional County Sanitation District not to allow direct tie-ins to the interceptors. Effluent is to be routed to the regional system through local agency collectors. Thus, the decisions of local governments with regard to the extension of collector systems will have greater influence on growth patterns than will the placement of the regional interceptors.

With regard to the density of future land use, the Facilities Engineer referred to existing general plans in determining the estimated ultimate population to be potentially served by regional facilities in each subarea. Since the population projections based on local agency estimates are no longer being used to size the regional treatment plant (the E-O series having been substituted), the initial population assumptions no longer apply to treatment plant sizing. The new sizing will serve a population level only 85 percent of that initially planned for by the Facilities Engineer. However, the outfall and the interceptors are planned to conform to the full population growth forecast, meaning that, should population growth take place faster than the rate of growth implicit in the E-0 series, the capacity of the treatment plant will be reached before 10 years have elapsed. As presently sized (22 mgd vs. 26 mgd initially), the treatment plant is expected to be able to serve only new development in the existing sewered area. Much of such development would be contiguous to existing development.

Impact on Agriculture, Tourism

Where new development takes place by accretion to existing urbanized areas, there is a tendency for undeveloped land at the fringe of the urbanized area to increase in value. This increase in value may cause pressures for development by raising the costs of ownership. Land value increases also encourage owners to sell open (often agricultural) land for urban development. This phenomenon is widespread throughout California wherever urban and rural uses interface and will continue to occur at such places as the edge of Salinas whether or not the project as proposed is built. Some agricultural land may be convert to urban use in response to growth pressures; in the Salinas area, some of this agricultural land loss may actually result from infill rather than outward expansion.

Tourism in the region is expected to continue to expand through the end of the century. The kinds of amenities which currently attract visitors - the coastline, the climate, the golf and other recreation facilities, the growing conference facilities - will continue to draw tourists. The added population will help supply the employees needed to serve tourist-related uses. On the other hand, as overall tourism increases, those who are interested in more secluded and less populated vacation spots may find northern Monterey County less appealing and the type of visitor attracted to the area may slowly change. The evolution of tourist areas from one type of clientele to another is not an uncommon development. (The Monterey Peninsula itself was a vacation spot for horseback riding earlier in the 20th century prior to the popularity of golf.) Such evolution in the character of tourism is not predictable from, nor closely related to, the provision of public services such as wastewater treatment; many other variables are involved.

Agricultural Land Conversion

Figure 2 opposite page 4 of the Draft EIS/EIR maps in general terms the existing and possible future municipal sewered areas to be served by the planned regional wastewater treatment system. Although boundaries have not yet been finalized, it is anticipated that the new regional wastewater agency's service area will include at the outset, only existing sewered urbanized areas (Figure 2). There may be some small additions made on Salinas' perimeter and northeast of Castroville (toward Oak Hills), but these possibilities have not been finalized. Future service area expansions will be determined as development proposals are made and approved by local and regional planning bodies. The Facilities Plan engineers mapped potential areas of expansion based on review of local and county general plans. The extensions north and east of Salinas and south of Castroville (as mapped in Figure 2) would impinge on valuable agricultural lands.

To discourage the loss of prime agricultural land to development along the system's interceptors, the wastewater agency board of directors has adopted a policy of not allowing tie-ins to the interceptors except as specifically authorized by local planning agencies. It is assumed tie-ins would therefore be in compliance with existing general plans. The SWRCB plans to place a condition on concept approval of the wastewater facilities plan, expressly forbidding tie-ins to regional interceptors at any location outside existing urbanized areas.

As the cost of the project is not proposed to be supported by property taxes but, rather, by user charges (service charges and connection fees), the impact of the project on land values is expected to be negligible. As the EIS/EIR points out (page 260), an appreciation in property values may result from a major investment in public infrastructure. However, that appreciation is not expected to be significant in the study area because the no-project condition does not severely restrict growth. Furthermore, the project appears unlikely to alter the present spatial distribution of development opportunities such as happens in many areas when new sewer interceptors "attract" growth. This effect appears unlikely in the present case because it is the policy of the new regional county sanitation district not to permit direct tie-ins to interceptors. Thus, changes in land values would be limited to those arising from extensions of, or capacity changes in, existing urban collector systems and the lands affected would tend to be within or immediately adjacent to existing urban development.

Construction Impacts

The construction-related impacts of the proposed project were discussed in detail on pages 188-198 of the Draft EIS/EIR. Additional measures should be taken to protect valuable topsoil material at all excavation sites; this includes interceptor alignments and treatment plant site. Topsoil should be stockpiled independently of subsoil and base parent material so that it can be replaced on the surface of fill areas once construction is complete. This will preserve the material's plant supportive capacity and improve chances of successful revegetation and/or landscaping.

Construction of the proposed interceptor from Salinas to the main treatment plant (route E-5 on Figure 30 of the Draft EIS/EIR) could result in significant disruption of normal agricultural operations between Salinas and the river-crossing at Blanco Road bridge. This prime agricultural land supports valuable vegetable crops throughout most of the year. The major adverse implications include temporary blockage of dirt access roads and interference with movement of farm machinery. Excavation and temporary construction-access roads could also temporarily remove land from production. These problems could be largely avoided by selecting one of the other alternative pipeline routes, but each route creates impacts less desirable than the proposed route. Therefore, efforts should be made to keep the construction-farming conflicts to a minimum. If possible, construction should be scheduled to coincide with periods of low farming activity.

Construction access roads and excavation should be kept within the bounds of existing rights-of-way as much as possible. The single-operation method of excavation, laying pipe and backfilling in a continuous operation should be utilized so that a minimal amount of open trench and active construction zone is maintained at any given time. All construction plans should be thoroughly discussed with the landowner and/or lessee prior to initiating work.

Resolving Issues

The Draft EIS/EIR identified as variety of environmental issues that had not been resolved at the time of report printing (see pages 337-342 of this document). These issues have been pursued in subsequent months and many have now been resolved or are no longer of consequence to the proposed project. A brief statement of issue status is included in the Summary of the Final EIS/EIR.

Project Financing, Costs

Allocation of Project Costs

As originally described in the project's financing plan and institutional program (Bartle Wells Associates, 1976), the proposed regional wastewater facilities would have cost a total of $71.4 million. This included construction of interceptors, a regional wastewater treatment plant, and an ocean outfall. It did not include the cost of tertiary treatment facilities. The cost split listed $10 million as the local share, $51.9 million as the state-federal grant award, and $9.5 million as the federal installations contribution. This estimate was based on a D-100 funding level for grant purposes and a 26 mgd treatment plant.

Subsequent actions have reduced the allowable limit to E-0 population levels for sizing the treatment plant; a 22 mgd plant is now proposed. The project financing and revenue programs have not yet been modified to reflect these changes, so new estimates of cost allocation are not available. Based on a simple ratio of original facilities plan population (263,600 in 1990) and current E-0 population (223,900 in 1990) used to size the treatment plant, a rough estimate of the plant's capital cost reduction would be $4.2 million, or a new treatment plant cost of $23.8 million as opposed to the original $28 million. The $4.2 million reduction in capital costs would be shared between the various project revenue sources.

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Project cost estimates based on other grant-fundable levels (i.e., E-150, D-150, C-100, etc.) have not been made, as the E-0 level is deemed necessary to maintain air quality standards within the basin.

Federal and state funding of wastewater treatment projects through the Clean Water Grant Program does not include costs of collector systems. Collectors and individual housing unit connections must be paid for locally; their construction is not being considered in the present 201 planning effort. Therefore, neither plans nor cost estimates for these facilities have been prepared by the project engineers.

Fort Ord Influence on Costs

According to the regional revenue program developed to finance the new wastewater treatment system, Fort Ord's financial participation in the system will be calculated on the basis of its flow contribution to the regional system. A straight proportional allocation is proposed. Fort Ord has taken exception to this method of allocation, and an agreement will have to be reached prior to verifying Fort Ord's participation.

If Fort Ord does not become a part of the regional wastewater system (see Fort Ord participation issue discussed earlier), adjustments will have to be made in project cost estimates and funding allocations. Preliminary estimates indicate the local share of project capital costs would increase about 9 percent with Fort Ord non-participation. Ooeration and maintenance costs would increase by about 7 percent (Monterey Peninsula Water Pollution Control Agency, pers. comm.).

Local Reclamation Costs

The feasibility of wastewater reuse on golf courses is currently being considered by both MPWPCA and the Carmel Sanitary District as part of separate 201 projects. Both agencies are considering reuse on golf courses in the Pebble Beach-Pacific Grove area. MPWPCA's study is looking at which of the two agencies could most effectively supply the reclaimed wastewater to the golf courses. Because federal and state grants are involved, the most cost-effective solution will undoubtedly receive support from the SWRCB and EPA. The cost-effectiveness analysis will not focus strictly on the golf course irrigation proposals, it will consider overall costs of both regional wastewater facilities planning projects.

Costs Related to Marina Participation

An earlier section of the report discusses the participation of Marina in the regional wastewater treatment system. Cost estimates associated with various non-regional options developed for Marina by George S. Nolte and Associates are included in that section and are therefore not repeated here.

User Charges

Single-family dwelling user charges were estimated at $4.50 per month in the Bartle Wells revenue plan. This rate has not been adjusted since publication of the Draft EIS/EIR. In order to calculate this rate, Bartle Wells projected annual connection charge revenues of $560,000. If growth does not occur as predicted for this estimate, user charges would have to be increased accordingly. The amount of the increase would obviously depend on the extent to which growth does occur.

Although the regional sanitation agency has the power to assess property or ad valorem taxes to finance construction and operation, they have indicated they will not use this method of revenue generation. Clean-water grant regulations imposed by EPA will not allow ad valorem taxation to raise revenue for operation and maintenance costs. In order to raise the local share of project construction costs, a local bond election must be held. This election is tentatively scheduled for June of 1978.

Cost-Effectiveness Comparisons

Cost-effectiveness analyses consider more than just economics. Social and environmental costs, technical feasibility and institutional constraints are all part of the formula for determining a most appropriate plan. All of these factors have played a part in determining which of the numerous wastewater treatment and disposal/reuse options is most advantageous for the Monterey-Salinas area.

Additional Alternatives

Golf Course Reuse

As stated in earlier responses, local golf course irrigation is being investigated by several wastewater agencies in the Monterey area. The MPWPCA is studying the feasibility of maintaining the Monterey treatment plant to provide wastewater for irrigating Monterey, Pacific Grove and Pebble Beach area golf courses. A decision has not yet been reached on whether to implement this type of local reclamation. The majority of the irrigation would occur in the summer months, with very little demand in the winter. Therefore, winter flows through the Monterey regional interceptor would not be reduced significantly during periods of normal peak flow. It is doubtful that the local reuse would allow regional facilities to be reduced in size. Before any local golf course irrigation scheme is implemented, a full project report and environmental impact report will have to be prepared.

Groundwater Injection

Groundwater injection in the Salinas Valley was considered as a reuse option in the early stages of project planning. The initial analysis conducted by Engineering Science, Inc. indicated this to be an expensive option, with high energy requirements, questionable effectiveness and considerable public health shortcomings (Engineering Science, Inc., 1975). For these reasons, groundwater injection was dropped from consideration. Further investigation of this option would be warranted if the agricultural demonstration project indicates irrigation reuse around Castroville is not desirable.

Marina Alternatives

Several additional wastewater treatment and disposal options were identified through comments on the North Monterey County Facilities Plan Draft EIS/EIR. The feasibility of these new options was discussed earlier in the "Marina Participation" responses.

"Living Filter" Secondary Treatment

The "living filter" or biological filter method of providing secondary wastewater treatment was given early consideration as a land disposal option. The additional treatment is accomplished by percolating primary effluent through a soil column and allowing plant uptake of the water. The initial analysis indicated there was not a sufficiently large area of land with the approximate soil type to implement this option at a regional scale. The study area's heavy use of groundwater as a source of domestic water supply also posed significant public health questions. For these reasons, "living filter" secondary treatment was dropped from consideration in favor of options with the potential for regional scale reclamation.

Algae Ponds

The method of treating wastewater in small algae-filled ponds has been utilized on a small scale, but is not a proven method for treating large volumes of water. The land area required to treat all flows projected within the project's service area would be quite extensive. In addition, the quality of the effluent produced by this treatment method is inferior to that of more conventional, proven secondary treatment systems (e.g., trickling filters, activated sludge). The project's goals of regionalizing wastewater management and reusing as much of the wastewater as is feasible have led to pursuit of alternatives with a better chance of effectively reclaiming the entire study area's wastewater production.

Individual Wastewater Treatment Systems

In recent years a multitude of on-site wastewater and solid waste treatment and disposal systems have been developed or revitalized. These systems are designed to treat and dispose of, or make available for reuse, the waste products generated at the individual dwelling unit. Each dwelling unit has an independent system. The dry toilet, compost privy and clevis are just a few of the individual treatment systems now being used at locations throughout the U.S. Many of these individual systems are capable of providing excellent, economical on-site waste treatment and disposal in rural or moderately developed residential areas. However, in densely populated urban areas with multi-family dwellings, apartment buildings, hotels and industrial plants, on-site treatment becomes impractical and can pose a real public health threat. Widespread use of individual treatment systems in today's urban environments will require a major public commitment to the need for recycling of wastes; it will also require some adjustments in existing life styles and social and psychological attitudes toward waste treatment.

Tertiary Treatment at Castroville

The tertiary wastewater treatment facilities to be constructed at Castroville as part of the agricultural irrigation demonstration project are not being designed as a permanent system. They will have capacity to treat only those flows needed for the demonstration project; they will not be capable of treating the total projected flows for the Castroville area. Only a part of the project's water supply will require tertiary treatment; control plots will be irrigated with water receiving less treatment. The possibility of maintaining the separate tertiary facility at Castroville for treatment of that area's waste flows can be given further consideration in the course of the agricultural demonstration project.

Solid Waste Disposal

The method of sludge treatment and disposal currently planned for the regional treatment facility includes digestion, sand bed drying on-site, and disposal in the Marina landfill. This will include reuse of the methane gas produced in sludge digestion; the methane will be burned to produce electrical energy, which will in turn help run the wastewater treatment plant. There are currently no plans to supply methane or electricity to outside markets. Composting of solid wastes and sewage sludge to produce mulch is not planned as part of the system. This possibility will remain open to future implementation, however, as the treatment plant and solid waste disposal site will be adjacent to each other. Development of such a system would require joint study by the new regional sanitation district and the garbage and refuse district.

Alternatives Preference

In the course of commenting on the Draft EIS/EIR, several individuals and government agencies voiced a preference for specific project alternatives. In some cases, preference for more than one alternative was indicated. While these preferences require no specific response in the Final EIS/EIR, they have been listed under the Alternatives Preference column of the comments matrix included at the beginning of this Response to Comments section.

Response to Specific Comments

Certain questions or comments directed at the Draft EIS/EIR could not be adequately responded to in the text of the general topic discussions preceding this section. Therefore, specific responses have been prepared and included on the following pages. The responses are grouped according to the individual or agency making the comment.

Federal Highway Administration

> *...it is recommended that the California Department of Transportation District 5 Office be contacted at the following address to obtain an update of the Transportation Improvement Project status in the project area...*

The District 5 office was contacted and a copy of the Monterey County Transportation Plan (California Department of Transportation, 1977) was received. This document was considered in preparing responses to the air quality comments on preceding pages.

Central Coastal Regional Coastal Zone Conservation Commission

> *To facilitate the reader in understanding the complexity of such a large project a complete explanation should be included at the beginning of the EIS which contains the following:*
>
> *A general project description and*
>
> 1. *the size of the proposed facility including the specific criteria used to determine the size (i.e. multiplier of g.p.c.d., p.w.w. projected population, etc.);*
> 2. *grant funding breakdown with the grant eligible portion; federal, state and local estimated shares;*
> 3. *when the decisions are anticipated for project implementation (i.e. implementation time-line for all phases of the project);*
> 4. *a listing of all outstanding studies, and unanswered or unresolved questions;*

5. *an assessment of the effect the incomplete studies or unanswered questions will have on the selection of a final project;*

6. *a statement as to why certain studies or significant questions remain unanswered;*

7. *projected population figures directly correlated to the AMBAG planning areas (include a map);*

8. *future areas to be sewered by the proposed project (include a verbal description or a more accurate map than Fig. 2); and*

9. *a list of the expected impacts with proposed and implementable mitigation of the impacts.*

These suggestions have been taken into consideration in preparing the Summary chapter of this Final EIS/EIR.

> *p. 1 Is Moss Landing part of the regional system--statement is misleading when taken in context of discussion on pgs. 23 & 24.*

Whereas Moss Landing has been within the planning area boundary of the North Monterey County Facilities Plan throughout the study, a separate facilities planning effort has also been undertaken for Moss Landing itself. This was necessitated by the urgency of Moss Landing's public health problems. The Moss Landing facilities planning effort has resulted in recommending that a local treatment plant be constructed to treat Moss Landing wastes. Disposal of the wastewater would be through the existing Kaiser industrial ocean outfall. For further information on the status of the Moss Landing project, contact James Waters of State Water Resources Control Board, Division of Water Quality.

> *p. 4 para. 2: What percentage of the estimated population will utilize septic systems; what is the estimated population for sewered and potential expansion of sewered areas?*

No estimates have been made as to the percentage of the service area population that will be using septic tanks in the future. For planning purposes, Engineering Science, Inc. assume that all persons within the service area (both initial and ultimate) would eventually be sewered by the regional facility. According to wastewater agency records, there were 155,750 persons sewered to the major existing wastewater treatment systems in 1974-1975 (see Table 21, page 111). This excludes Fort Ord, having an estimated base population of 24,294 for the 1975 calendar year. Total sewered population was therefore just over 180,000. If growth occurs within the potential sewered area as envisioned by local planning agencies, an additional 83,600 persons could be added to the sewered total by 1990. However, the E-0 size limitation placed on the treatment plant would limit the 10-year sewered growth potential to 43,900.

> *p. 11 para. 2: Comparison between Alternative 166 & 134 implies that ocean discharge in the winter season mitigates the impacts of 166 whereas 134 could create water quality problems. Wouldn't Alt 134 be discharging during the winter season, during the time of the year when freshwater runoff is the greatest?*

The Alternative 134 river discharge would occur whenever irrigation demand dropped below the plant's effluent output. A small surface storage reservoir would be used to equalize deliveries to the irrigation system during minor fluctuations in irrigation demand, but at the beginning and end of the irrigation season when demand would be considerably lower than the effluent output, discharge to the river would be necessary. It is quite likely that river discharges would occur when the river was still in a low-flow state, especially in the fall and spring of low rainfall years. Irrigation demand is usually low in these seasons, and quite often rains in the Salinas River watershed are not sufficient to increase lower river flows until late November or December, and they may taper off by late February or early March.

> *p. 12 para. 3: The figures on population do not correspond to those presented on p. 4, nor to the calculated growth rates.*

The population figures presented on page 4 are for the project's proposed "service area" -- that area possibly served by the wastewater facilities; those on page 12 are for the facilities plan "study area" -- the total area considered in planning for wastewater facilities, which is much larger than the potential service area (see Figure 2 opposite page 4 for the boundary delineation).

p. 12 para. 4: Mitigation for the potential loss of prime agricultural should be mentioned as a future objective caused by secondary impacts. Additionally, an increased demand for public service facilities (schools, major recreational facilities, hospitals, etc.) will also increase sewer loads for those specialized services.

Mitigations for loss of prime agricultural land are included on pages 17, 288 and 289 of the Draft EIS/EIR. They include: 1) use of Williamson Act land protection; 2) encouraging infill rather than peripheral development or sprawl; 3) encouraging high density development in newly urbanized areas; and 4) prohibition of tie-ins to interceptors outside of urbanized areas.

Wastewater flows from commercial and institutional facilities needed to serve the additional population growth are included in the flow projections for this project.

p. 14 para. 2: Statement should indicate that unless Alternative 134 were selected alternative sources of water would be essential for mitigation.

Alternative 134 would not in itself provide mitigation for loss of flows from the existing City of Salinas discharges. The Alternative 134 river discharge would be located in the lagoon area, it would not replace flows in the river between the City of Salinas and the lagoon. In order to mitigate this loss of flow, even Alternative 134 would need to provide a substitute water source in this stretch of the river.

p. 24 last para.: What is the status of the Moss Landing facility? This statement still implies regional consolidation of all existing facilities.

The status of the Moss Landing facilities planning effort was discussed in response to an earlier comment.

p. 147 para. 1: Is the Moss Landing area still part of the regional consolidation? How does the recently approved Step 1 Grant to the Castroville Sanitation District relate to the regional consolidation program?

See page 24 response above in regard to Moss Landing. The Step 1 grant to the Castroville Sanitation District (CSD) allows that agency to explore the possibility of sewering the new high school northeast of town and the Oak Hills development, in addition to looking at other areas that may eventually need sewer service in the vicinity. The project may eventually lead to an expanded CSD service area. The regional system service area will initially include only the present CSD. If at some future time it is decided the CSD boundaries should be expanded, this would in turn enlarge the regional sanitation district's service area. Wastewater capacity has been included in the regional facility to accommodate a service area expansion around Castroville.

p. 154 para. 2: What were the economic disadvantages as evaluated by E. S., Inc.? Dismissal of the sites at Fort Ord requires a more detailed explanation.

Engineering Science, Inc., indicated in their March 1976 Working Paper (Engineering Science, Inc., 1976b) that cost considerations included influent pumping costs, and construction costs for interceptor alignment, ocean outfall and reclaimed water delivery line. They also indicated that it would probably be a difficult and long process to determine whether Army property would be made available for public use. The fact that neither Fort Ord site appeared to offer an environmental advantage when compared to Site 4 also influenced the decision to drop the Fort Ord sites from consideration. In addition, Site 4 offers the opportunity to utilize land owned by the garbage and refuse disposal district and is close to a viable sludge disposal site.

p. 163 para. 4: Is a cost/benefit analysis for off-site energy use going to be done?

No detailed cost/benefit analysis of off-site energy use potential is being considered as part of this facilities planning effort. As noted in Table 33 (page 170), the sludge digestion process may generate the energy requirements of the secondary treatment plant. The potential for reliable energy generation in usable amounts beyond this level is remote using existing energy recovery technology. However, this type of analysis may be conducted by the regional sanitation district once a more accurate estimate of energy production becomes available.

p. 166 Table 32: Where is Table III-7 which was utilized to determine the average D.W.F.?

Table III-7 referred to in the Table 32 footnote is included on page III-13 of the Draft Facilities Plan Report (Engineering Science, Inc., 1976a) prepared by Engineering Science, Inc.

p. 172 para. 1: What is the controversy which has developed over the level of treatment which would be required for discharge to the lower river? How does this concern relate to the use of level III or level V treatment?

In the course of developing alternatives for this project, several members of the project Technical Advisory Committee expressed the opinion that it might be acceptable to discharge effluent to the lower Salinas River with less treatment than currently required by the RWQCB. These opinions were taken under consideration by MPWPCA, and subsequently the project engineers and environmental consultants were authorized to analyze two different levels of treatment for a river discharge. Treatment level V is recommended by the RWQCB; level III eliminates the need for nutrient removal, chemical coagulation and secondary sedimentation.

p. 176 para. 1: Why is the design capacity for Alt. 166 less than Alt. 134 & Alt. 170?

The design capacity for all three alternatives would be identical.

p. 176 para. 3: How large would the wastewater storage facility have to be to store winter flows?

The winter storage facility would be the same size as that described for Alternative 170 -- approximately 900 acres of surface coverage or 9,000 acre-feet of storage capacity.

p. 182 para. 2: What percentage of the projected populations would be located in presently unsewered areas? By what basis were population projections determined, growth rates, land use plans, zoning?

It is not known what percentage of the future service area population will be located in presently unsewered areas. However, the initial boundaries of the regional sanitation district are planned to coincide with existing wastewater agency service boundaries. This indicates initial service will be restricted for the most part to areas that are already sewered.

Original facilities plan population projections were determined by requesting projections from local government agencies and districts. Where these projections did not coincide with existing service area boundaries, Monterey County Transportation Study zones and population estimates were used to identify population centers.

County and local general plans were used to identify likely high-density developments outside existing wastewater service areas. The combination of these materials was used to develop the potential service area boundary and future populations within that service area. The original facilities plan population projections have now been superseded by SWRCB E-0 projections for purposes of sizing the regional wastewater treatment plant.

> *p. 182 para. 3: Because it was difficult to predict population growth in the Salinas and Castroville areas doesn't seem like a logical reason to over design an already high-cost facility. An evaluation of land use restrictions and a determination of the local government's capability of providing adequate public services to those areas would be a good start towards realistic population expectations. An over-designed sewer facility could have significant growth-inducing impacts in these predominantly rural areas.*

As indicated in paragraph 3 of page 182 in the Draft EIS/EIR, the Salinas and Castroville regional interceptors are to be sized for 20-year projected population estimates rather than ultimate population. This will result in a smaller pipe size, not an oversized line. The smaller size was chosen specifically to avoid oversizing the lines to those areas where prediction of future population was most difficult.

> *p. 184: The general discussion of "Waste and flow reduction measures" is encouraging considering the severe water shortage within the study area; however, why is the figure of 74 gpcpd utilized if the design of all facilities and the costs could be reduced through the measures as illustrated?*

The 74 gpcd estimate of household wastewater flows presented in Table 36, page 185 of the Draft EIS/EIR is an example of typical national flows developed by EPA. It was not used by the project engineers to size wastewater facilities for the North Monterey County study area.

> *p. 201 para. 4: This statement is only true if the additional winter storage facilities for Alt. 134 & Alt. 166 aren't built.*

It is true that if winter storage was eventually included as part of Alternatives 134 or 166, they would have the same potential for groundwater contamination as Alternatives 170 and 171. However, neither 134 nor 166 are presently designed to include winter storage.

p. 203 para. 1: If the question of an appropriate method for sludge disposal requires a geologic study as suggested by RWQCB, couldn't this study be expanded into the geohydrologic study discussed on page 182?

Combining these two investigations would be desirable if both were needed. However, selection of Alternative 166 as a recommended plan has eliminated the need for a storage site investigation, and use of sand-drying beds for dewatering of sludge should make a geohydrologic investigation at the landfill site unnecessary.

p. 203 para. 3: What percentage of upstream reservoir releases reach the river below the Blanco Drain?

The percentage of reservoir releases reaching below Blanco Drain fluctuates from year to year. Releases are regulated to avoid surface flows below Chualar whenever possible. All surfaced water passing this point is considered wasted, as it does not enter the underground water supply used by agricultural and domestic interests downstream. When summer releases are properly regulated, there is no flow in the river below Chualar. The latest published records of waste flows indicate 86,586 acre-feet of surface water passed Salinas in the 1969-1970 water year, and only 5,115 acre-feet passed in 1970-1971. Total releases for those years were 236,053 and 171,072 acre-feet, respectively. These wasted flows are often the result of testing or maintenance work at the reservoir release points (Monterey County Flood Control and Water Conservation District, 1971 and 1972).

p. 206 para. 2: What type of study, how long would it take, and how much would it cost to determine whether nitrogen and/or phosphorus are limiting factors in this water course?

Estimates of the time and cost involved in studying nutrient balance in the Old Salinas River-Elkhorn Slough water system cannot be made without a clear definition of study objectives and scope. This determination is not within the scope of the current North Monterey County 201 planning effort.

p. 217 para. 2: Was the information from U.C. Davis mapped?

Yes, the cadmium concentrations were mapped on a general level for the lower Salinas Valley.

p. 225 para. 1: Is there a "back-up" contingency plan for sewage treatment in the event a rupture occurs in the pipeline between the peninsula cities and the treatment plant?

The only back-up contingency provided for major breaks in interceptors is a series of shut-off valves in the pipes to halt flows when repairs or maintenance is necessary. No long-term storage or alternative treatment facilities are available.

p. 226 para. 4: When is the anticipated completion date of the detailed geotechnical evaluation? This appears to be a rather significant piece of information needed prior to making a selection of a preferred alternative.

The reconnaissance level geotechnical evaluation completed in mid-January of 1976 was utilized in analyzing treatment plant and interceptor route alternatives. No major seismic-geologic problem areas were identified in this study. Detailed geotechnical evaluations of treatment plant site, interceptor routes and ocean outfall will be conducted in the project's design stage. This is scheduled to be completed in September of 1978.

p. 241 para. 4: (See previous comment.) Does this statement propose a direct discharge to the federal wildlife refuge? Such a proposal would have to be in full compliance with the President's Executive Order on the Protection of Wetlands 5/24/77.

The land being managed by the State Department of Fish and Game at the mouth of the Salinas River is not presently designated as a national wildlife refuge. The land is owned by the U. S. Fish and Wildlife Service, but is managed under a cooperative agreement by the California Department of Fish and Game as a wildlife area. The U. S. Fish and Wildlife Service administers the agreement through their South San Francisco Bay National Wildlife Refuge office.

Section 8 of the President's Executive Order 11990 (Protection of Wetlands) indicates the Order does not apply to projects "for which a draft or final environmental impact statement will be filed prior to October 1, 1977". It therefore does not pertain to this project. However, the spirit of this Order is being followed as indicated by the request for further analysis of wildlife and vegetation mitigation measures for the Salinas River (see the Summary).

p. 242 para. 4: If the Potrero Road tidegates were closed on the Old Salinas River how or by what mechanisms would the Salinas Valley flows reach the ocean?

All flows would reach the ocean by passing through or breaching the sand bar that frequently closes the river's mouth. If flows were insufficient to breach the sand bar, water levels in the lagoon would rise slightly with closure of the tidegates.

p. 270 para. 5: To date, land and resources constraints have not played a significant role in directing or controlling growth, especially in the northern portion of the study region.

Topographic and soils limitations and water availability have had minor influences on development location in northern Monterey County to date. Similar resource constraints should play an increasing role in locating future development in this part of the study area.

p. 272 para. 1: If not "indefinitely", how long can growth continue without a conjunctive water management program? Wouldn't the transport of water through the sewer system further aggravate the overdraft on the Hill Unit Hydrologic Sub-basin? (See D.W.R. report.)

A finite period of continued growth cannot be predicted without making a long list of unsupportable assumptions on water availability, population growth rates, infrastructural capacities and local and state development constraints. Continued development and sewering of the north county hill area will undoubtedly increase the overdraft of the Hill Unit hydrologic sub-basin and eventually require tapping of outside water sources or tapering off of development.

p. 274 para. 1: The trend for new growth in rural areas has been occurring in north Monterey County. The ideal and most desirable land use planning approach would have been the concentration of development in existing urban areas where existing public services were available. Further research should be done to assess the past trends of growth in this region.

Without incentives to concentrate development in existing urban areas growth will always move toward the suburban/rural areas. With rural growth comes new demands for public services generally at high

> *costs both environmentally and economically. We therefore disagree that "most of the north county" could be a growth center. Monterey County's 1964 and 1968 General Plan more realistically identified future growth centers (i.e. Prunedale, Castroville, Las Lomas/Hall). The topography alone will limit most of north Monterey County from becoming "urban".*

The statement in the Draft EIS/EIR that "most of the north county" could become a growth center should have been qualified. Local landform and access constraints obviously restrict potential growth to the relatively flat, low-lying canyon bottoms or flat terrace lands of the north county. The past pattern of suburban development in this area offers a good indication of which natural and public service factors have influenced the location of growth to date.

> *p. 275 para. 3: An average urban density of 26.6 persons per residential acre is probably not a realistic figure for most "rural" areas of Monterey County. This figure might be appropriate if all 3,000 acres were incorporated within city boundaries. If this growth is within unincorporated lands the acreage figure will be much higher.*

The density of future developments outside existing urban areas will depend on a variety of factors, but perhaps the most important is local planning agency policy as implemented through zoning ordinances. If both county and city planning bodies respond positively to potential state-imposed planning constraints (e.g., agricultural land preservation, air quality maintenance planning), future urban developments may be predominantly of the high density variety.

> *p. 280 para. 5: What was the final criteria utilized by the project engineers in providing the SWRCB with the potential service area? The criteria stated on p. 182? Facility plans of the local General Plans? Land use plans?*

The potential service area was developed by first identifying existing sewered areas and then estimating likely areas of future urban-density development through review of existing general plans and present and planned road nets. Local planning agencies were consulted to obtain the latest information on the status of general plans and zoning. This delineation can only be considered an estimate; however, the eventual configuration of the service area will depend upon a variety of factors, including resource availability, general plan and zoning restrictions, and the local economy.

> *p. 285 para. 2: Oak Hills is a suburban subdivision as discussed on p. 284. Las Lomas is neither an urbanized area nor contiguous to an urban area. It should be mentioned that Las Lomas (outside of the project study area) is currently under a Regional Water Quality Control Board building ban due to failure of numerous septic tanks. Las Lomas is currently under a Step Grant Program with alternatives indicating transport of the areas wastewater to the Pajaro system via a pipeline; therefore, it is unlikely that Las Lomas will be served by the regional system discussed in this document.*

While it is true that the Las Lomas-Hall area is not adjacent to any large, urbanized population, its development density (quarter- and half-acre lots) is great enough to warrant a Step 1 facilities planning effort. The Draft EIS/EIR did not indicate that this area could be hooked into the North Monterey regional wastewater system, only that its development density is sufficient to warrant eventual sewering.

> *p. 285 para. 3: The statement concerning soil limitations for septic tank use north of Marina is misleading. The 1975 S.C.S report indicates "severe" septic tank limitations for most of the soils of north Monterey County. In working with the Monterey County Health Department we have been informed that the S.C.S. data is generally disregarded when dealing with septic tanks. Rather the health department staff relies upon site by site analysis since the underlying soils are generally much different than those indicated in the S.C.S. report.*

The U. S. Soil Conservation Service data referred to on page 285 is of a general nature and is valuable for planning purposes only. As indicated in the second sentence of paragraph 3, on-site testing is conducted to determine septic tank suitability of specific sites. The general soils information is valuable for indicating typical or prevalent soil conditions over large areas; normally the Soil Conservation Service data describes only the top 50-60 inches of soil mantle.

p. 285 para. 4: Sufficient land may exist to absorb 25 years of "low" density growth but are the infrastructural resources going to be available? (See earlier comments on D.W.R. report.)

The EIS/EIR reports that land resources are sufficient to permit continued low-density growth in the north county area through the year 2000. Whether infrastructural resources will be available to support this growth cannot be determined at this time. A possible impediment to growth on a site-by-site basis is the availability of water. A recently published report prepared by the California Department of Water Resources, (1977) indicates that there is already a groundwater overdraft in the hills around Prunedale. Inability to tap underground water sources may well constrain the developability of certain parcels, but the extent of this problem is unknown.

p. 292 para. 3: A population utilizing a water conservation program and a population without water conservation which utilize the same size sewerage facility will not have the same growth potential. The more water saved through conservation, the greater the residual treatment capacity.

Paragraph 3 of page 292 indicates several possible methods of reducing water demand; water conservation efforts are a positive approach to cutting demand. While water conservation efforts may reduce flows into wastewater systems, thereby making available additional capacity to accommodate growth, it would be unwise to allow development to utilize this added capacity unless conservation is made permanent through changes in building codes, city-county ordinances, or other means.

Association of Monterey Bay Area Governments (AMBAG)

The EIS lists a number of ways to mitigate the project impacts and several agencies which could possibly implement them. It is unclear which of these measures, if any, are included as part of the proposed project.

The list of mitigation measures included in the Final EIS/EIR Summary indicates the most likely agent of implementation and whether or not the measure is planned as part of the project.

The Sierra Club-Ventana Chapter

What will happen if EPA does not approve the Alternative chosen?

EPA review of the facilities planning effort to date and consideration of environmental impacts through the Draft EIS/EIR has resulted in concurrence with MPWPCA's choice of projects (Alternative 166). If a grant applicant were to select a project that was unacceptable to EPA, the federal grant offer would be withdrawn.

On Table 45, why is the ultimate size projected for the Facilities Plan so large?

The Facilities Plan population projections shown in Table 45 were developed in consultation with local planning agencies and are their best estimate of future population levels. The SWRCB projections are not intended to accurately indicate future population levels, they are simply an indicator of the level of funding to which the state is willing to commit itself. They are therefore quite often lower than local population projections. Actions taken by EPA and the SWRCB subsequent to distribution of the Draft EIS/EIR have cut back the size of the population to be used in sizing the wastewater treatment plant to the E-0 level.

Ms. Gail Christen

Do we have primary treatment now for most of the Peninsula and discharge to the outfalls?

There are currently 5 wastewater treatment plants and 5 ocean outfalls along the Monterey Peninsula-South Monterey Bay coastline. Two of these systems discharge primary-treated effluent to the Bay (Pacific Grove and Seaside County Sanitation District) and the other three (Monterey, Fort Ord and Marina County Water District) discharge secondary effluent. These systems are described in greater detail on pages 110-112 of this report.

Mr. Warren Hurst

> *Is there a reason why upstream communities were not included in this report, if, in fact, their effluent does reach Salinas?* (Refers to communities along the Salinas River upstream from the City of Salinas.)

The SWRCB Basin Plan for the Central Coastal Basin recommended separate facilities planning efforts for the communities of central and upper Salinas Valley (California State Water Resources Control Board, 1975). This includes Chualar, Gonzales, Soledad, Greenfield, King City, Camp Roberts, Paso Robles and Atascadero. Therefore, they were not included in the North Monterey County facilities planning effort. Paso Robles is the only community that still discharges wastewater to the Salinas River. Land disposal systems are now in use by all of the other wastewater facilities.

Mr. J. C. Lyons

> *And I would like to come out in support of the use of irrigation alternatives. I do have a question, though. How is this to be conveyed? It mentions in the two alternatives that I like, Alternative 170 and 171, that the water will be conveyed from this tertiary treatment plant to Castroville for use. Who's going to pay for it? Will the people who benefit from the fertilizer value of the effluent pay for it? Will it come from all of the taxpayers in Monterey County? What will the conveyance form be? Will it be a pipe main going out to a centralized system?*

The irrigation delivery pipeline would be constructed as part of the regional tertiary treatment facilities and would be financed in the same manner as the rest of the system -- through user charges and hook-up fees collected throughout the project service area. Those farmers utilizing the reclaimed wastewater would be charged for the water use; they would not be directly responsible for financing the irrigation delivery pipeline. The question of who will construct and finance a distribution system at the end of the delivery line has not yet been answered. The delivery line is expected to be a 36-inch gravity line extending from the regional treatment plant site to the irrigation area, probably in the vicinity of Castroville. A network of distribution lines would extend from the delivery pipe out to surrounding farms.

Mr. Herman Weaver

> *...where are the boundaries of this system liable to be? I live in San Rancho. Is it going to effect that? Not that I feel bad about that; I just am curious. Is there any boundaries established?*

The boundaries of the initial regional sanitation district have not been established to date. It is proposed that the district will include only existing sewer service areas at the outset. Eventually the district could expand to include other developed or developing portions of the study area. Existing and potential sewered areas are mapped in Figure 2, opposite page 4 of this report. The map is general because more specific boundaries are yet to be determined.

Revisions to the Text of the Draft EIS/EIR

Minor changes to the text of the Draft EIS/EIR suggested in public review are included below. The page and paragraph of the change is indicated along the left hand margin. The comment is indicated by italics and the new wording follows.

> *p. 3 para. 3: Taking of shellfish is more than a frequent occurrence in Elkhorn Slough; an actual ban exists. "Frequently" is a nebulous term--how many times & the duration over the last ten years would provide a more accurate description of the problem.*

The following sentence should be added to paragraph 3. Elkhorn Slough and adjacent beaches have been posted against shellfish harvesting since 1969 due to bacterial contamination.

> *p. 4 para.5: Project alternative elimination process implies that "all assumptions" received by the TAC were agreed to--this is untrue; if the record of the meetings was reviewed the basis for many of the assumptions were questioned. Such general statements give a false impression to the public.*

Insert following the end of the sentence in line 1, page 8. Because the TAC was advisory only, consensus on planning assumptions was not required. Assumptions were occasionally questioned by one or more TAC members.

> *p. 13 para. 2: Statement should continue that therefore information generated as part of "208" studies should be incorporated with the alternative which is finally selected and implemented.*

Add to paragraph 2. The ongoing "208" planning study being conducted by AMBAG is considering "non-point" sources of pollution; therefore information being developed by AMBAG will aid in present and future 201 planning efforts in the area.

> *p. 13 para. 4: Is the statement in the first sentence correct? An improvement of future oxidant levels does not correspond with the other information.*

No text change required.

> *p. 17: Growth-related Impacts--last statement should include "i.e.,...unique vegetation, and prime agricultural land).*

Add to sixth mitigation under General-Land Water, etc. ...and prime agricultural land.

p. 22 para. 2: Page 22 mentions that the Marina County Water District is a member of the MPWPCA joint powers agreement which is incorrect.

Delete "Marina County Water District" from third sentence of paragraph 2.

p. 34: Soils Section--We recommend the inclusion of the Prime Agricultural Soils Map in this section, and a map to relate the potential new sewered areas and Fig. 10 to the existing land use map.

Add to the end of paragraph 2 -- Figure 40 opposite page 272 maps prime agricultural land within the study area.

p. 36 para. 6: The 800-acre Wildlife Area managed by the California Dept. of Fish and Game is a National Wildlife Refuge administered by the U. S. Fish and Wildlife Service as part of the San Francisco Region Refuge System.

Add after the fourth sentence of paragraph 6. The Wildlife Area is owned by the U. S. Fish and Wildlife Service and is administered through the South San Francisco Bay National Wildlife Refuge office in Fremont, California.

p. 39 para. 2: The Department of Fish and Game believes that commercial fleets will probably remain the same size in Moss Landing and Monterey.

Delete "or decline" from the second sentence of paragraph 2.

p. 39, para. 3: Pages 39 and 102. There is a difference in population figures of 25,000 and 22,500. If this difference is due in reference to resident population and military strength, this distinction should be indicated.

No revision necessary. The page 102 figure is an interpolation of 1990 and year 2000 estimates; the exact year at which an on-base population of 25,000 will be reached is not presently known. The 25,000 total is expected to be a ceiling figure for Fort Ord.

p. 39 para. 3: ...it is suggested that the EIS be revised on page 39 and other sections which discuss military strength and family housing units. A proposed revision to page 39 is as follows:

"Military...and 350 units of residential housing ~~will soon be added~~ are under construction ~~at the rate of 350 units a year, with a final total of 1,000 new units~~ and a base population ~~not exceeding~~ approximately 25,000 ~~by 1996~~. No other units are currently authorized. However, the Army recognizes the need for approximately 2,000 additional units. Some portion of this need could be constructed on-post with the remaining being provided by the civilian community...."

The above change to paragraph 3 should be made as indicated.

p. 40 para. 5: Page 40 indicates a moratorium on new sewer connections is in effect in Marina, however, this moratorium has been lifted for quite a while.

The last sentence in paragraph 5 should be deleted.

p. 40 para. 7: When will the Corps re-evaluation of the flood potential be available for public review?

The first sentence of paragraph 7 should be deleted. See the revision for page 42 below for more detail on flood hazard mapping.

p. 42 para. 2: ...information provided on pages 42 and 257 concerning flood hazard mapping requirements may not be entirely accurate. Clarification of this information can be obtained by contacting the Federal Insurance Administration.

Paragraphs 2 and 3 should be deleted and replaced with the following. The incorporated Cities of Monterey, Pacific Grove, Seaside and Salinas are presently participating in federally-approved flood insurance programs; Sand City, Del Rey Oaks, Marina, and the county's unincorporated areas are not. Preliminary flood hazard boundary maps for most of the study area have been prepared by a private firm under contract to the U. S. Federal Insurance Administration (FIA). Communities may apply to the FIA for enrollment in flood insurance programs even before the preliminary mapping is complete. In order to be accepted into a program, the applicant must demonstrate that they are in some way controlling development in flood hazard areas. If flood hazard maps have been made available and the local jurisdiction fails to enroll, flood insurance and federal financing may be withheld in the area. Detailed flood mapping is being done throughout the United States by various government agencies and private firms. Once this mapping is complete, actuarial rates for insurance can be set. It is expected that the detailed mapping of the study area will not be completed until at least 1979 or 1980.

p. 55 para. 2: The statement is made that some of the ground water is extracted but most flows underground into Monterey Bay. This may be true of the shallow "perched" aquifer but not the 180' or 400' aquifers.

The last sentence in paragraph 2 should be revised to read -- The underground water is the chief source of domestic and agricultural water supply in the lower Salinas Valley; surface waters are therefore encouraged to percolate to the underground aquifers through control of flows at upstream dams.

p. 56 para. 2: The statement is made that releases from the dams are percolated to the ground water or diverted for municipal and agricultural use. There are no diversions from the river.

Delete "or diverted" from the second sentence of paragraph 2.

p. 70 para. 1: This statement should be modified to include recent information from D.W.R. report "North Monterey Water Resources Investigation" March, 1977.

Add the following paragraph to follow paragraph 1. A recently published California Department of Water Resources (1977) report indicates that groundwater overdrafting is also occurring in the hilly, rolling terrain north and east of Castroville. In 1971, an estimated 4.3 acre-foot overdraft occurred in the Hill hydrologic unit, which extends roughly from Castroville eastward to Highway 101 and north to the edge of the Pajaro River floodplain. By 1990 the overdraft is expected to reach 15.4 acre-feet.

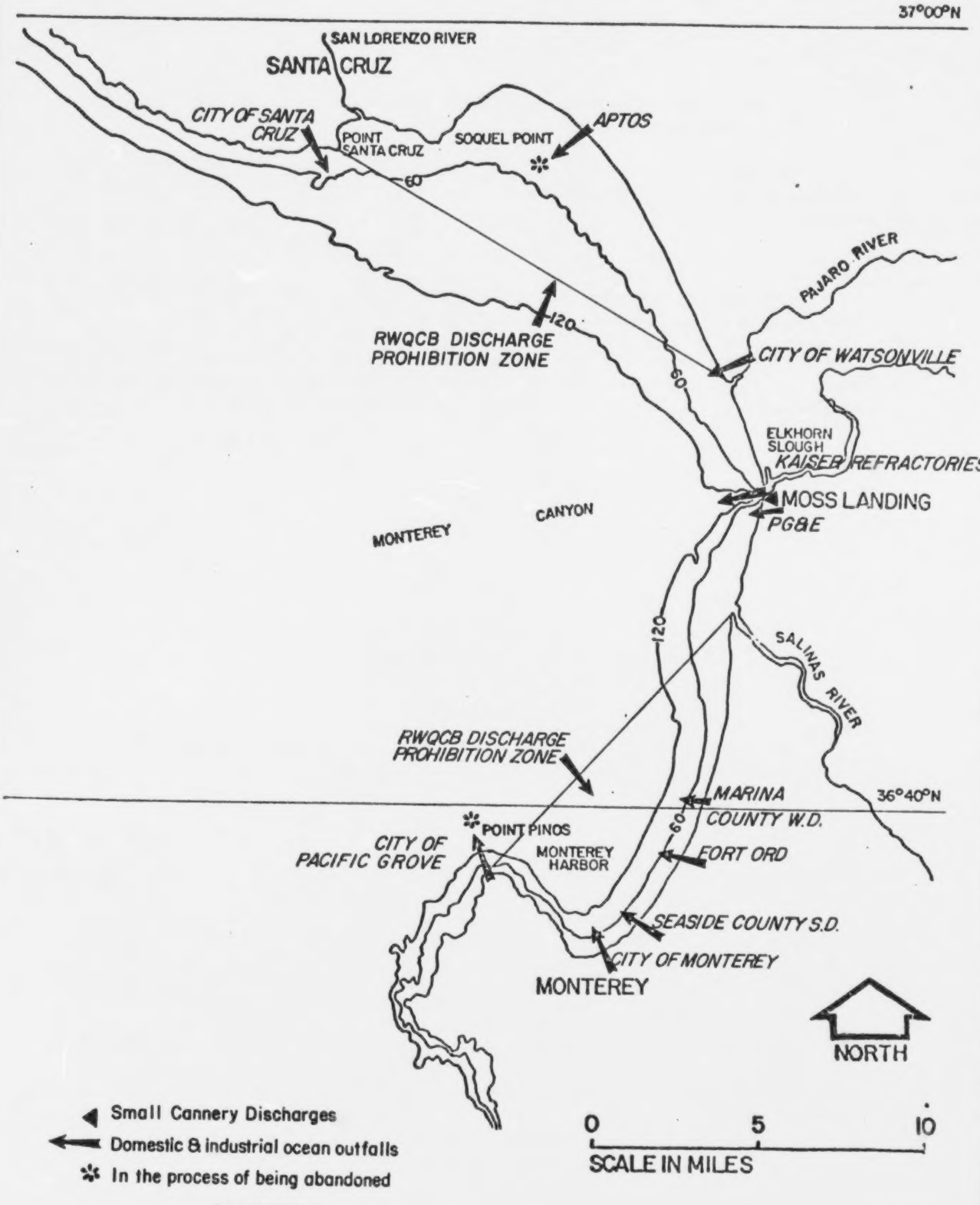
p. 73 para. 3: Statement and Figure 23--should be modified to correspond to D.Pirie's final publication, "California Coastal Processes Study - Landsat II Final Report Landsat Investigation #22200".

Pirie and Steller's final report corroborates and expands on coastal current descriptions provided in the earlier Pirie and Murphy investigation with only minor variations. No text revisions are necessary; see California Coastal Processes Study - LANDSAT II Final Report LANDSAT Investigation #22200 (D. M. Pirie and D. D. Steller, April 1977) if details are desired.

p. 81 Figure 24: Discharges in Moss Landing area should include cannery outfalls.

Delineation of RWQCB discharge prohibition zone in north Monterey Bay.

Revised Figure 24 is attached.


37°00'N
SAN LORENZO RIVER
SANTA CRUZ
CITY OF SANTA CRUZ
POINT SANTA CRUZ
SOQUEL POINT
APTOS
60
PAJARO RIVER
120
RWQCB DISCHARGE PROHIBITION ZONE
CITY OF WATSONVILLE
60
ELKHORN SLOUGH
KAISER REFRACTORIES
MOSS LANDING
PG&E
MONTEREY
CANYON
120
SALINAS RIVER
RWQCB DISCHARGE PROHIBITION ZONE
MARINA COUNTY W.D.
36°40'N
POINT PINOS
CITY OF PACIFIC GROVE
MONTEREY HARBOR
60
FORT ORD
SEASIDE COUNTY S.D.
CITY OF MONTEREY
MONTEREY
NORTH
Small Cannery Discharges
Domestic & industrial ocean outfalls
In the process of being abandoned
0
5
10
SCALE IN MILES

(REVISED)
FIGURE 24 EXISTING OCEAN DISCHARGES TO MONTEREY BAY

p. 85 para. 1: Sardines are present, but rarely seen in Monterey Day.

Delete third sentence in paragraph 1 and replace with -- Sardines are still present in the Bay, but they are rarely seen.

p. 88 para 4: See comment p. 36 para. 6.

Delete second sentence in paragraph 4 and replace with -- The largest contiguous piece is located near the coast immediately south of the river; it is owned by the U. S. Fish and Wildlife Service but is managed by the California Department of Fish and Game as a wildlife area under a cooperative agreement with the U. S. Fish and Wildlife Service.

p. 96 para. 6: On page 96, delete the last line: "reoccupying much of their former range"; the southern sea otter now occupies only 165 miles (10%) of its former range (Baja California to the Straits of Juan de Fuca).

Delete last line of paragraph 6 and replace with -- reoccupying approximately 10 percent of its former range.

p. 97, Table 13: The southern sea otter, Table 13, should be designated: Enhydra lutris nereis; the Table has omitted the subspecific name of this marine mammal.

An asterisk should be placed after Enhydra lutris and the following footnote added to the bottom of Table 13 -- * Enhydra lutris is accepted by the California Department of Fish and Game as the appropriate scientific name for the southern sea otter. The U. S. Department of Interior, in designating the species as threatened in the Federal Register (Vol. 42, No. 10, Friday, January 14, 1977), identified the species as Enhydra lutris nereis. There is disagreement as to whether the California and Alaskan populations of sea otters are a single species or separate sub-species.

p. 97, Table 13: The sea otter range is from Avila Beach to Santa Cruz. Approximately 100 sea otters range within the study area.

Distribution and habitat of the sea otter in Table 13 should be modified to include a range from Avila Beach to Santa Cruz.

p. 143: The U. S. Coast Guard also would require permits for any pipeline bridges over the tidal (or historically tidal) portions of Elkhorn Slough, Moro Cojo Slough, Tembladero Slough, Salinas River, Old Salinas River and their tidal tributaries. Tidal effect normally ceases where the bottom elevation of these watercourses exceeds 2.5' above Mean Sea Level. Subsurface crossings within the tidal reach would be under the jurisdiction of the U. S. Army Corps of Engineers.

Delete paragraph 3 and replace with -- U. S. Coast Guard would regulate pipeline construction in bay waters or on bridge crossings over Elkhorn, Tembladero and Moro Cojo Sloughs and the Salinas and Old Salinas Rivers or their tidal tributaries. Regulation is primarily to ensure boating safety.

p. 149 para. 1: ..."extension of the existing Marina Outfall for the purpose of serving only Marina was determined to be relatively expensive and infeasible", however, evaluation of this alternative by George S. Nolte and Associates has shown this extension to be definitely feasible and one of the least expensive alternatives available to Marina.

The first sentence of Item #2 in paragraph 1 should be followed by (This contention is disputed by a 1977 wastewater alternatives analysis prepared for the Marina County Water District by George S. Nolte & Associates.) The Nolte & Associates cost figures are disputed in two SWRCB letters; see Volume I Appendix.

p. 151 para. 2: Alt. 134 -- An explanation why some of the T.A.C. members questioned the "tertiary" requirement should be included in the discussion section.

No text revision necessary. The tertiary treatment question is discussed in the Response to Specific Comments section -- Central Coastal Regional Coastal Zone Conservation Commission comments.

p. 172 para. 2: Why is the plant's design capacity for Alt. 134 (26 m.g.d.) 1.6 m.g.d. greater than in Alt. 1?

In first and second sentences of paragraph 2, delete 26 mgd and replace with 25.4 mgd. These numbers are no longer accurate, as the plant's capacity has been reduced to about 22 mgd.

p. 189, Table 38: The "significant long term" impacts of failure to revegetate excavations along the Salinas River, Tembladero or Alisal Slough (p. 190) are not indicated on Table 38, construction impacts.

No revision necessary. Revegetation would be required at all stream crossings, therefore the impact is appropriately rated at ML rather than SL.

p. 192 para. 2: The southern sea otter should not have been omitted from the discussion, p. 193, of wildlife species that might be impacted by the Project.

Add the following to the end of paragraph 2. The southern sea otter, recently classified as a threatened species by the U. S. Department of the Interior, ranges along the study area's entire coastline. It is a year-round resident.

Add the following as a new paragraph after paragraph 5. While the sea otter is not likely to be affected by project construction, the eventual discharge of secondary wastewater effluent to central Monterey Bay will add small amounts of trace metals, organic chemicals and pesticides to the otter's environment. While the long-term effect of these materials on the otter population is not completely known, the cumulative effect of man's waste disposal into the ocean could eventually have a negative impact on the otter. However, the elimination of numerous shallow water, nearshore discharges in favor of a single, deep water outfall, as proposed in this project, should reduce chronic contamination of the sea otter's habitat.

p. 199 para. 4: Groundwater Quality--Reference to the California Dept. of Water Resources Report "North Monterey Water Resources Investigation" March, 1977, should be included in this discussion section.

Add after the second sentence in paragraph 4 -- A recently published California Department of Water Resources report (1977) indicates overdrafting in the coastal and hill areas north of Castroville will increase from about 10.5 acre-feet per year in 1971 to more than 20 acre-feet in 1990. This gives an indication of how rapidly groundwater pumping is increasing in northern Monterey County.

p. 199 para. 4: The statement is made that no estimate of present ground water overdraft in the Pressure Area is available. They cite the 1955 estimate of 20,000 acre feet. In the Castroville Irrigation Project EIR it is estimated that an average overdraft of 55,000 acre feet per year will occur with ultimate development.

Delete the first two sentences of paragraph 4 and replace with -- Groundwater overdraft in the pressure area was estimated at 20,000 acre-feet in 1955. While no recent estimate has been made, the Monterey County Flood Control and Water Conservation District has predicted a total overdraft of 55,000 acre-feet per year with ultimate basin development.

> *p. 206 para. 4: ...implies that Marina's discharges create an occasional health hazard on the beaches, however discussions with the Monterey County Health Department (Walter Wong and Glenn Joesten) indicate the Marina Outfall is not a health hazard.*

Delete the last sentence in paragraph 4 and replace with -- High coliform bacteria counts along the beaches in the Fort Ord-Seaside-Monterey area and in the vicinity of Moss Landing indicate some of the nearshore or surf zone discharges also create an occasional health hazard.

> *p. 230 para. 2: The statement concerning the beneficial use of taking shellfish if the "bacterial" contamination is removed is a misleading statement. Based upon previous comments this would only be true if non-point source contaminants are not limiting as well.*

Add to the end of sentence 6, paragraph 2 -- ... however, as non-point source bacterial contamination is also a significant problem in Elkhorn Slough.

> *p. 234: "Impacts on Terrestrial Wildlife and Vegetation". This section fails to discuss potential impacts on the Salinas River National Wildlife Refuge. Since this refuge is part of the near riparian area of the lower river system the impacts and mitigation techniques should also address the refuge specifically.*

No revision necessary. Impacts to the California Department of Fish and Game-managed wildlife area at the mouth of the Salinas River are discussed on pages 237-238 and 242-243 of the Draft EIS/EIR.

> *p. 248 para. 3: Clarification is needed on the use of the 4-3/8 percent interest rate quoted on p. 248. This fiscal year it is 5-5/8 percent. An additional clarification would be helpful in that this interest rate applies to excess lands only. Apparently 35 percent of the lands are excess and 65 percent are not. The latter category is interest free.*

Delete the second sentence of paragraph 3 and add -- The Monterey County Flood Control and Water Conservation District has applied for a loan (current interest rate is 5-5/8 percent) from the U. S. Bureau of Reclamation to finance the project. Interest is charged only for excess lands involved in the project; therefore, 35 percent of the loan would require interest payments and the other 65 percent would be interest-free.

p. 257 para. 3:

Delete paragraph 3 and replace with -- Preliminary flood hazard maps have been prepared for the Cities of Seaside, Monterey and Salinas, and for the unincorporated portions of the study area. Because the maps are general in nature, the determination of actual flood threat in specific locations is impossible. The following impact analysis is therefore general in nature and flood hazard should be re-evaluated when detailed maps become available.

p. 257 para. 5: None of the proposed treatment plant sites are in a flood prone area.

Add after sentence 2 in paragraph 5 -- None of the proposed regional treatment plant sites is within flood-prone areas.

p. 287 para. 4: What about other factors such as the preservation of critical natural resources (i.e., Elkhorn Slough Estuarine Complex, Salinas River National Wildlife Refuge, etc.)?

Revise the third sentence in paragraph 4 as follows. The location and availability of water supply, additions and improvements in the road network, and efforts at preserving prime agricultural land, scenic resources and valuable natural areas are other factors at least co-equal in shaping northern Monterey County's urban form in the future.

p. 322 para. 4: (see comments p. 36 para. 6); therefore, limitations for the use of reclaimed wastewater would have to comply with federal standards.

The last sentence on page 322 should be revised as follows. Reuse requirements should be checked through the RWQCB, the State Health Department, and the U. S. Fish and Wildlife Service.

p. 329: Unavoidable Adverse Impacts - Under the summary entitled "operation," we believe that the following potential adverse impacts of ocean disposal should be considered:

- *a) Biological accumulation of trace elements*
- *b) Biological accumulation of trace organic materials*
- *c) Chronic toxicity from chemical constituents in dilution zone*
- *d) Impact of growth inducing factor causing increase in waste loading to marine environment.*

The following impact should be added under the Operation heading of the table on page 329 - Possible bioaccumulation of trace elements and organic chemicals in the vicinity of the outfall and chronic toxicity in the dilution zone. Checkmarks should be placed in the Alternative 1, 134 and 166 columns.

p. 337:

An asterisk should be placed at the end of the title on page 337 and the following footnote added at the bottom.
* An update of environmental issues status is included in the Summary of the Final EIS/EIR (Volume I).

p. 569: On June 10, 1977, the Board took steps to amend the prohibition date for discharges to south Monterey Bay as contained in the Basin Plan and on page 569 of the report. If concurrence is obtained from the State Board and EPA, the new prohibition date will be July 1, 1983. The Board also adopted enforcement orders against the peninsula cities which require elimination of the discharges to the south bay by 1982, which coincides with the estimated project completion date given by the agency.

An asterisk should be placed after "Effective July 1, 1977" in the first sentence of #1, bottom of left-hand column, page 569. A footnote should be added reading -- * The Central Coastal RWQCB has recommended extending the discharge prohibition date to July 1, 1983. EPA and SWRCB concurrence is required.

NOTE: Page 569 referred to above is now page 190 of Volume II - Final EIS/EIR.

p. 573: Wildlife habitat is a recognized beneficial use in coastal waters both north and south of the Salinas River.

On Table N-2, add x's to the Wildlife Habitat columns of "Coastal Water North of Salinas River" and "Coastal Water South of Salinas River".

NOTE: Page 573 referred to above is now page 194 of Volume II, Final EIS/EIR.

REFERENCES CITED IN PREPARATION OF FINAL EIS/EIR

References

Bartle Wells Associates. 1976. Financing plan and institutional program - North Monterey County regional water pollution control project.

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California. Department of Water Resources. 1977. North Monterey water resources investigation.

California. State Water Resources Control Board. 1975. Water quality control plan report, central coastal basin (3), part 1.

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----------. 1976. Facilities plan for north Monterey County, interim report no. 4; draft oceanographic predesign report, volume 1.

----------. 1976a. Facilities plan for north Monterey County, interim report no. 3, draft facilities plan report.

----------. 1976b. Facilities plan for north Monterey County, working paper - preliminary design of wastewater facilities.

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----------. 1974. Public law 984, loan application report in support of the proposed Castroville irrigation project.

U. S. Environmental Protection Agency and Monterey Peninsula Water Pollution Control Agency. 1977. Draft environmental impact statement and report - north Monterey County facilities plan.

Personal Communications

Monterey Peninsula Water Pollution Control Agency. July, 1977. Preliminary calculations of local share cost increases associated with Fort Ord non-participation in regional project, prepared by Robert Jaques, MPWPCA engineer.

Sullivan, Richard. July 21, 1977. California American Water Company, Monterey, California.

Waters, James. July 22, 1977. California State Water Resources Control Board, Division of Water Quality.

VOLUME I APPENDICES

Final EIS/EIR Distribution List

Letter from Ann Peak & Associates (concerning archeology)

California Department of Fish and Game Species List for Salinas River Lagoon Wildlife Area

SWRCB Letters to George S. Nolte & Associates

AMBAG Planning Areas Map

Table 57 - Dry Weather Wastewater Flows

NORTH MONTEREY COUNTY FACILITIES PLAN FINAL EIS/EIR

Distribution List

FEDERAL AGENCIES

Environmental Protection Agency

U. S. Environmental Protection Agency
Office of Legislation A-103
Congressional Affairs Division
Washington, DC 20460

U. S. Environmental Protection Agency
Office of Federal Activities A-104
Washington, DC 20460

U. S. Environmental Protection Agency
Office of Public Affairs A-107
Washington, DC 20460

U. S. Environmental Protection Agency
Region IX, EPA Library
100 California Street
San Francisco, CA 94111

U. S. Environmental Protection Agency
Region IX
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San Francisco, CA 94111

U. S. Environmental Protection Agency
Office of Water Programs Operations
Oil & Special Materials Control
Division (WH-548)
Washington, DC 20460

U. S. Environmental Protection Agency
Los Angeles Contract Office
300 North Los Angeles Street
Los Angeles, CA 90012

Public Reference Unit (PM 213)
EPA, Room 2922
401 "M" Street, SW
Washington, DC 20460

Council on Environmental Quality

Council on Environmental Quality
722 Jackson Place, NW
Washington, DC 20006

Department of Interior

Department of Interior
Office of Environmental Projects
Review, Room 5308
Interior Building
Washington, DC 20240

Bureau of Land Management
Bureau of Indian Affairs
Bureau of Reclamation
Bureau of Outdoor Recreation
U. S. Fish & Wildlife Service
U. S. Geological Survey
National Park Service

Department of Agriculture

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Regional Forester
Land Use Planning Office
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Davis, CA 95616

U. S. Soil Conservation Service
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Salinas, CA 93901

U. S. Department of Agriculture,
Central Coast Resource Conservation
and Development Project
137 Auburn Street
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Department of the Army

U. S. Army Corps of Engineers
Environmental Resources Branch
South Pacific Division
630 Sansome Street
San Francisco, CA 94111

U. S. Army Corps of Engineers
Environmental Branch
District Office
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San Francisco, CA 94102

Department of the Army
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Environmental Branch
District Office, Sacramento District
650 Capitol Mall
Sacramento, CA 95814

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Executive Director of Civil Works
Office of the Chief of Engineers
Washington, DC 20314

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San Francisco, CA 94105

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18th and F Street, NW
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Department of Housing and Urban Development

Department of Housing and Urban Development
Region IX Office
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San Francisco, CA 94102

Federal Energy Administration

Federal Energy Administration
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NPO Building, Room 7119
12th & Pennsylvania Avenue, NW
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Department of Health, Education & Welfare

Department of Health, Education & Welfare
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San Francisco, CA 94102

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San Francisco, CA 94111

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Federal Highway Administration
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Environment and Design
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San Francisco, CA 94111

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Northern California, Marine
Environmental Protection Branch
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630 Sansome Street
San Francisco, CA 94126

Urban Mass Transportation Administration
Office of Program Operations
400 Seventh Street, SW
Washington, DC 20590

Office of Marine Environment and Systems
U. S. Coast Guard
400 Seventh Street, SW
Washington, DC 20590

Department of Commerce

Department of Commerce
Deputy Assistant Secretary for
Environmental Affairs
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Commerce Building, Room 2816
Washington, DC 20230

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National Marine Fisheries Service
Environmental Assessment Division
3150 Paradise Drive
Tiburon, CA 94920

National Marine Fisheries Service
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Terminal Island, CA 90731

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Federal Power Commission
Advisor on Environmental Quality
Office of Energy Systems
825 North Capitol Street, NE
Washington, DC 20426

Advisory Council on Historic Preservation

Advisory Council on Historic
Preservation
Office of Architectural and
Environmental Preservation
1522 K Street
Washington, DC 20005

Advisory Council on Historic
Preservation
P. O. Box 25085
Denver, CO 80225

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Office of Architecture and
Environment Arts Program
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2401 E Street, NW
Washington, DC 20506

National Committee on Water Quality
1111 Eighteenth, NW
Washington, DC 20036

Water Resources Council
Office of the Associate Director
2120 L Street, NW, Suite 800
Washington, DC 20037

National Science Foundation
Special Assistant, Office of the
Deputy Assistant Director for
Astronomical, Atmospheric, Earth
and Ocean Sciences
1800 G Street, NW, Room 1248
Washington, DC 20550

National Wildlife Federation
Attn: Robert J. Colten, Counsel
1412 16th Street, NW
Washington, DC 20036

Honorable Leon Panetta
U. S. House of Representatives
California District 16
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State Office of Inter-Governmental
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State Clearinghouse
1400 Tenth Street
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Sacramento, CA 95801

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Monterey, CA 93940

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1416 Ninth Street
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Sacramento, CA 95814

State Department of Conservation
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1400 Tenth Street
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744 P Street
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455 Golden Gate Avenue
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Salinas, CA 93901

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Salinas, CA 93901

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Water Conservation District
Monterey County Courthouse
Salinas, CA 93901

Castroville County Water District
P. O. Box 658
Castroville, CA 95012

Marina County Water District
Attn: General Manager
11 Beach Street
Marina, CA 93933

Monterey County Transportation
Commission
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Salinas, CA 93901

CITY AGENCIES

City of Carmel
Public Works Department
Carmel City Hall
Carmel, CA 93921

City of Del Rey Oaks
Public Works Department
650 Canyon Rey Road
Del Rey Oaks, CA 93940

City of Monterey
Public Works Department
Pacific and Madison
Monterey, CA 93940

City of Pacific Grove
Public Works Department
Forest and Laurel Avenue
Pacific Grove, CA 93950

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Public Works Department
200 Lincoln Avenue
Salinas, CA 93901

City of Seaside
Public Works Department
400 Harcourt Avenue
Seaside, CA 93955

Sand City
Public Works Department
City Hall
Sand City, CA 93955

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City of Monterey
200 Del Monte Avenue
Monterey, CA 39940

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Laguna Seca Ranch
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Environmental Resources Associates
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Preston and McDougall
Castroville, CA 95012

East Salinas Branch Library
1207 East Market
Salinas, CA 93901

El Gabilan Branch Library
1400 North Main
Salinas, CA 93901

Monterey Library
Madison and Pacific
Monterey, CA 93940

Pacific Grove Library
Central and Fountain Avenues
Pacific Grove, CA 93950

Hartnell College Library
156 Homestead Avenue
Salinas, CA 93901

John Steinbeck Library
110 West San Luis
Salinas, CA 93901

Marina Branch Library
371 Carmel Avenue
Marina, CA 93933

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1054 Haveland Terrace
Seaside, CA 93955

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Attn: Leslie Johnson
Dolores and Eighth Avenue
Carmel, CA 93921

Castroville Times
112 Pieri Court
Moss Landing, CA

El Sol Newspaper
P. O. Box 81
Salinas, CA

Marina Tribune
P. O. Box 485
Marina, CA

Monterey Peninsula Herald
Attn: M. L. Rasmussen
Pacific & Jefferson
Monterey, CA 93940

Salinas Californian
P. O. Box 1091
Salinas, CA 93901

Monterey Peninsula Review
P. O. Box 6115
Carmel, CA 93924

North County News
615 Baumann Road
Castroville, CA

Pacific Grove Tribune
305 Forest Avenue
Pacific Grove, CA

Salinas Newspapers, Inc.
123 West Alisal
Salinas, CA

KIDD News
Attn: Ilene Cashman
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Monterey, CA 93940

Seaside Post
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ANN S. PEAK & ASSOCIATES
CONSULTING ARCHEOLOGY

July 21, 1977

Jones & Stokes Associates
2321 P Street
Sacramento, California 95816

ATTENTION: Mike Rushton

SUBJECT: Cultural Resource Section, Monterey Regional Wastewater Treatment Project.

Gentlemen:

In response to the agency comments on the archeological section of the above-mentioned project, we have prepared the following statement:

1) The area in question has not been fully determined as a prehistoric site. The surface evidence is tenuous and ill-defined. Bone fragments are present but historic trash (glass, metal and concrete) was also noted in the immediate area and the bone could be of recent deposition. Possible flakes of stone were also found, but the local rock has a natural tendency to flake. This leaves some doubt as to whether the chips are natural in origin or are by-products of deliberate tool manufacture.

2) At present, the proposed alignment follows the existing paved road and does not impinge upon the sand dune area where the possible site is located. As long as the present alignment is used, there will be no impact upon the area in question.

3) Should the presently proposed route be changed and placed to the west across the dune, the recommendations to test excavate for determination and evaluation of the possible prehistoric site should be followed. No less than two 1 x 2 meter units would then be advisable along the area of impact, if it crosses the sand dune.

Sincerely,

Ann S. Peak

Ann S. Peak
President

AP:jm

8332 WILLOWDALE WAY - FAIR OAKS - CALIFORNIA - 95628 - (916) 967-3684

PLANT LIST FOR SALINAS RIVER LAGOON WILDLIFE AREA

Common Name	Scientific Name
Yellow sand verbena	*Abronia latifolia*
Pink sand verbena	*Abronia umbellata*
Salt bush	*Atriplex* sp.
Sea rocket	*Cakile maritima*
Brass buttons	*Cotula coronopifolia*
Branching sea aster	*Corethrogyne leucophylla*
Croton	*Croton californicus*
Salt marsh dodder	*Cuscuta salina* var. *major*
Salt grass	*Distichlis spicata* var. *stolonifera*
Rock lettuce	*Dudley caespitosa*
Giant rye grass	*Elymus* sp.
Coast eriogonum or buckwheat	*Eriogonum latifolium*
Lizard tail	*Eriophyllum staechadifolium*
Beach poppy	*Eschscholzia californica* var. *maritima*
Beach-bur	*Franseria chamissonis* ssp. *bipinnatiscecta*
Cotton-batting plant	*Gnaphalium chilense*
Gumplant	*Grindelia latifolia* ssp. *platyphylla*
Mock heather	*Haplopappus ericoides*
Fleshy jaumea	*Jaumea carnosa*
Silky beach pea	*Lathyrus littoralis*
Bush lupine	*Lupinus arboreus* (yellow)
Indian melilot, sweet clover	*Melilotus indicus*
Sea fig, ice plant	*Mesembryanthemum chilense*
Beach primrose	*Oenothera cheiranthifolia*
Cut-leaved plantain	*Plantago coronopus*
Poison oak	*Rhus diversiloba*
California blackberry	*Rubus vitifolius*
Dock	*Rumex* sp.
Pickleweed	*Salicornia virginica*
Purple sand spurrey	*Spergularia rubra*
Shore morning-glory	*Convolvulus soldanella*
Knotweed	*Polygonum paronychia*
Buckwheat family	*Chorizanthe pungens*

BIRD LIST TAKEN FROM WATER BIRD COUNTS AT SALINAS RIVER LAGOON 1971 AND 1972 AND A LIST EXTRACTED FROM LITERATURE AND FIELD TRIP BY ELGIN BLAINE HURLBERT 1960-1975

Common Name	Scientific Name
Common loon	*Gavia immer*
Red-throated loon	*Gavia stellata*
Red-necked grebe	*Colymbus grisegena*
Horned grebe	*Podiceps auritus*
Eared grebe	*Podiceps caspicus*
Western grebe	*Aechmophorus occidentalis*
Pied-billed grebe	*Podilymbus podiceps*
White pelican	*Pelecanus erythrorhynchos*
Brown pelican	*Pelecanus occidentalis*
Double-crested cormorant	*Phalacrocorax auritus*
Great blue heron	*Ardea herodias*
Green heron	*Butorides virescens*
Great egret	*Casmerodius albus*
Snowy egret	*Leucophoyx thula*
Black-crowned night heron	*Nycticorax nycticorax*
American bittern	*Botaurus lentiginosus*
Whistling swan	*Olor columbianus*
Canada goose	*Branta canadensis*
Black brandt	*Branta nigricans*
Mallard	*Anas platyrhynchos*
Gadwall	*Anas strepera*
Pintail	*Anas acuta*
Green-winged teal	*Anas crecca carolinensis*
Blue-winged teal	*Anas discors*
Cinnamon teal	*Anas cyanoptera*
American wigeon	*Anas americana*
Shoveler	*Anas clypeata*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Canvasback	*Aythya valisineria*
Greater scaup	*Aythya marila*
Lesser scaup	*Aythya affinis*
Common goldeneye	*Bucephala clangula*
Bufflehead	*Bucephala albeola*
Oldsquaw	*Clangula hyemalis*
White-winged scoter	*Melanitta deglandi*
Surf scoter	*Melanitta perspicillata*
Common scoter	*Melanitta nigra*
Ruddy duck	*Oxyura jamaicensis*
Red-breasted merganser	*Mergus serrator*
White-tailed kite	*Elanus leucurus*

Common Name	Scientific Name
Cooper's hawk	Accipiter cooperii
Marsh hawk	Circus cyaneus
Red-tailed hawk	Buteo jamaicensis
Rough-legged hawk	Buteo lagopus
Golden eagle	Aquila chrysaetos
American kestrel	Falco sparverius
California quail	Lophortyx californicus
Ring-necked pheasant	Phasianus colchius
Virginia rail	Rallus limicola
Sora rail	Porzana carolina
Clapper rail	Rallus longirostris
American coot	Fulica americana
Semi-palmated plover	Charadrium semipalmatus
Snowy plover	Charadrium alesandrinus
Killdeer	Charadrium vociferus
Black-bellied plover	Squatarola squatorola
Ruddy turnstone	Arenaria interpres
Black turnstone	Arenaria melanocephala
Common snipe	Capella gallinago
Long-billed curlew	Numenius americanus
Whimbrel	Numenius phaeopus
Spotted sandpiper	Actitis macularia
Willet	Catoptrophorus semipalmatus
Greater yellowlegs	Totanus melanoleucus
Lesser yellowlegs	Totanus flavipes
Knot	Calidris conutus
Pectoral sandpiper	Calidris melanotos
Baird's sandpiper	Calidris bairdii
Least sandpiper	Calidris minutilla
Dunlin	Calidris alpina
Short-billed dowitcher	Limnodromus griseus
Long-billed dowitcher	Limnodromus scolopaceus
Western sandpiper	Calidris mauri
Marbled godwit	Limosa fedoa
Sanderling	Calidris alba
American avocet	Recurvirostra americana
Black-necked stilt	Himantopus mexicanus
Red phalarope	Phalaropus fulicarius
Wilson's phalarope	Steganopus tricolor
Northern phalarope	Lobipes lobatus
Glaucous-winged gull	Larus glaucescens
Western gull	Larus occidentalis
Herring gull	Larus argentatus
California gull	Larus californicus
Ring-billed gull	Larus delawarensis
Mew gull	Larus canus
Bonaparte's gull	Larus philadelphia
Heermann's gull	Larus heermanni
Black-legged kittiwake	Rissa tridactyla
Forster's tern	Sterna forsteri
Common tern	Sterna hirundo

Common Name	Scientific Name
Least tern	*Sterna albifrons*
Royal tern	*Thalasseus maximus*
Elegant tern	*Thalasseus elegans*
Caspian tern	*Hydroprogue caspia*
Mourning dove	*Zenaida macroura*
Burrowing owl	*Speotyto cunicularia*
Screech owl	*Otus asio*
Short-eared owl	*Asio flammeus*
Snowy owl	*Myctea scandiaca*
Anna's hummingbird	*Calypte anna*
Allen's hummingbird	*Selasphorus sasin*
Belted kingfisher	*Megaceryle alcyon*
Black phoebe	*Sayornis nigricans*
Say's phoebe	*Sayornis saya*
Horned lark	*Eremophila alpestris*
Bank swallow	*Riparia riparia*
Rough-winged swallow	*Stelgidopteryx ruficellis*
Barn swallow	*Hirundo rustica*
Cliff swallow	*Petrochelidon*
Common crow	*Corvus brachyrhynchos*
Bewick's wren	*Thryomanes bewickii*
Long-billed marsh wren	*Telmatodytes palustris*
Water pipit	*Anthus spinoletta*
Loggerhead shrike	*Lanius ludovicianus*
Starling	*Sturnus vulgaris*
Orange-crowned warbler	*Vermirora celata*
Yellow warbler	*Dendroica petechia*
Audubon's warbler	*Dendroica auduboni*
Common yellowthroat	*Geothlypis trichas*
Western meadowlark	*Sturnella neglecta*
Red-winged blackbird	*Agelaius phoeniceus*
Brewer's blackbird	*Euphagus cyanocephalus*
Brown-headed cowbird	*Molothrus ater*
House finch	*Carpodacus mexicanus*
Pine siskin	*Spinus pinus*
American goldfinch	*Spinus tristis*
Lesser goldfinch	*Spinus psaltria*
Brown towhee	*Pipilo fuscus*
Savannah sparrow	*Passerculus sandwichensis*
White-crowned sparrow	*Zonotrichia leucophrys*
Golden-crowned sparrow	*Zonotrichia atricapilla*
Song sparrow	*Melospiza melodia*

STATE OF CALIFORNIA—THE RESOURCES AGENCY

EDMUND G. BROWN JR., Governor

STATE WATER RESOURCES CONTROL BOARD

DIVISION OF WATER QUALITY

P. O. BOX 100 • SACRAMENTO 95801
(916) 445-7971

In Reply Refer
to: 515:JW

JUL 18 1977

Board of Directors
Marina County Water District
11 Beach Road
Marina, CA 93933

NORTH MONTEREY COUNTY AREAWIDE FACILITIES PLAN, PROJECT NO. C-06-1066, FUNDING OF SEPARATE FACILITIES FOR MARINA

My letter of May 17, 1977, to Mr. Charles Kahr of George S. Nolte and Associates related a number of comments based upon the brief review of your report that I made at that time. The conclusion of my letter was that most of the alternatives discussed in the report were either excessively expensive and/or involved unacceptable environmental impacts. The only two alternatives that appeared to have any potential were the ones that involved the continued use of your treatment works and disposal via the regional facilities.

Subsequent to the time of my letter, I have discussed the matter with Bob Jaques of the Monterey Peninsula Water Pollution Control Agency and Jerry Cole of Engineering-Science, Inc. Their review of the report brought to light another significant comment concerning the allocation of your District's present operation and maintenance budget.

Table 4 on Page 45 of your report shows that your present annual cost of operation and maintenance is $166,000. If you convey raw wastewater to the regional facilities and no longer maintain your own treatment facilities, the table indicates that the operation and maintenance of your collection system only would cost $153,000 per year. This implies that the present annual operation and maintenance cost of your treatment and disposal facilities is only $13,000 per year. This allocation appears to be highly unrealistic. Typically, operation and maintenance of treatment works require more money than collection systems.

For purposes of discussion, I have reallocated your annual O&M budget to $96,000 for the treatment works and $70,000 for the collection system. The attached table shows how this reallocation affects the present worth of the first five alternatives evaluated in your report. Alternative No. 1, connection to the regional system's interceptor and treatment plant, now has a present worth that is equal to your Alternative No. 2. This result is significant in that the reallocation that I made still reflects a high cost for collection system maintenance, in my opinion. Furthermore, Bob Jaques also indicated that the estimated $328,400 per year regional system user charge also appears high. Such a charge would result in a monthly homeowner user charge which is greater than the figure of $4.50 per month that is anticipated. Adjustment of these estimates would further reduce the present worth of this alternative.

Consolidation would be more effective in the achievement of water quality objectives than the other alternatives because it would have a more reliable treatment system and probably require less energy to operate. Therefore, consolidation appears to be the most cost-effective alternative.

Under these circumstances, grant funding will only be given if Marina chooses to convey raw wastewater to the regional interceptor and treatment plant. The attached table also shows that the least costly alternative for your District, given this constraint, would be full consolidation with the regional facilities.

If you have any questions concerning this letter, please contact Larry Pearson at (916) 322-6483 or me at (916) 322-6488.

ORIGINAL SIGNED BY
Pearson

James L. Waters
WRC Engineer

cc: Mr. Bob Baldridge
CRWQCB, Central Coast
Region (3)

Mr. Tony Mei
Environmental Protection
Agency, Region IX
100 California Street
San Francisco, CA 94111

Mr. Jerry Cole
Engineering-Science, Inc.
600 Bancroft Way
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Mr. Don Flautt
City of Marina
211 Hillcrest Avenue
Marina, CA

Mr. Charles Kahr
George S. Nolte & Associates
P. O. Box 820
San Jose, CA 95112

Mr. Dudley Lapham
Monterey Peninsula Water
Pollution Control Agency
P. O. Box 190
Monterey, CA 93940

✓Mr. Mike Rushton
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2321 P Street
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COST COMPARISONS OF ALTERNATIVES FOR THE MARINA COUNTY WATER DISTRICT

Alternative	Capital Cost	Operation & Maintenance		Present Worth		Annual Costs to MCWD	
		Collection	Treatment & Disposal	Amount	Ranking	With Grants	Without Grants
1	815,256[1]	70,000	245,296[2]	4,155,506	1	312,200	NA
2	1,178,000	70,000	209,500	4,139,000	1	307,300	390,700
3	1,781,900	70,000	209,500	4,743,000	2	321,500	447,700
4	2,515,000	70,000	186,600	5,232,000	3	316,000	494,000
5	2,164,000	70,000	257,600	5,635,000	4	378,700	531,900

NOTES:

1. Cost to provide capacity for Marina in the Regional Treatment Plant based upon the six-tenths power rule.

2. Reduced from Nolte estimate to delete the portion of the user charge used to pay capital recovery of the local share of the project costs.

STATE OF CALIFORNIA—THE RESOURCES AGENCY
EDMUND G. BROWN JR., Gov.
STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER QUALITY
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(916) 445-7971

In Reply Refer
to: 515:JW

Mr. Charles S. Kahr
George S. Nolte & Associates
P.O. Box 820
San Jose, CA 95112

MARINA COUNTY WATER DISTRICT/NORTH MONTEREY COUNTY WASTEWATER FACILITIES PLAN, PROJECT NO. C-06-1066, REVIEW OF MCWD WASTEWATER FACILITIES STUDY

I have briefly reviewed your report prepared for the Marina County Water District and have developed the following comments:

COST COMPARISONS

Table 15 on page 56 of the report compares the annual cost to the MCWD of the various alternatives. While this is a useful table for decision making, federal regulations require that cost comparisons be made on a present worth basis over a 20-year planning period with respect to total public dollars - including grant funds.

In addition, the cost comparison should discuss the costs or savings to the regional project of the additional alternatives that you have considered.

ENERGY CONSIDERATIONS

A comparison of the energy requirements of the various alternatives will be required. Comparison should be made of the amounts of energy required and not just the cost of that energy. This may be significant because the MCWD treatment plant has an aerobic solids handling system while the anaerobic solids handling at the regional plant not only requires less energy to operate but recovers the methane for fuel.

SEPARATE OCEAN OUTFALL ALTERNATIVE

The alternative of extending Marina's existing outfall outside of the discharge prohibition zone does not appear to warrant further investigation. In the first place, such a proposal would be opposed by the Regional Water Quality Control Board. Furthermore, your own analysis indicates that use of a joint outfall would be more cost effective from everyone's viewpoint.

HIGH RATE FODDER IRRIGATION

Without an assessment of the impacts on the groundwater supply, this alternative would be unacceptable. The State Health Department, for example, opposed a plan proposed by Fort Ord two years ago to use spray irrigation for disposal due to adverse impacts on groundwater resources.

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FODDER IRRIGATION PLUS RIVER DISPOSAL

This alternative is also likely to be opposed by the Regional Board because it would not allow attainment of water quality objectives for the Salinas River.

OTHER RECLAMATION ALTERNATIVES

The remaining alternatives appear to be either excessively expensive, difficult to implement and manage, and/or have potential adverse impacts.

In summary, MCWD might have a case for retaining its own treatment plant rather than building capacity in the regional facility. However, the report indicates that Marina's effluent should be disposed along with the effluent from the regional plant.

You should submit this report and any additional material you develop to the Regional Board and the MPWPCA for comments. Their involvement will be mandatory prior to any SWRCB decision on your proposals.

If you have any questions, please feel free to contact me at (916) 322-6488.

ORIGINAL SIGNED BY

James L. Waters
WRC Engineer

cc: Mr. Dudley Lapham
MPWPCA
P.O. Box 190
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Mr. Jerry Cole
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Mr. Bob Baldridge, CRWQCB, Central Coast Region (3)

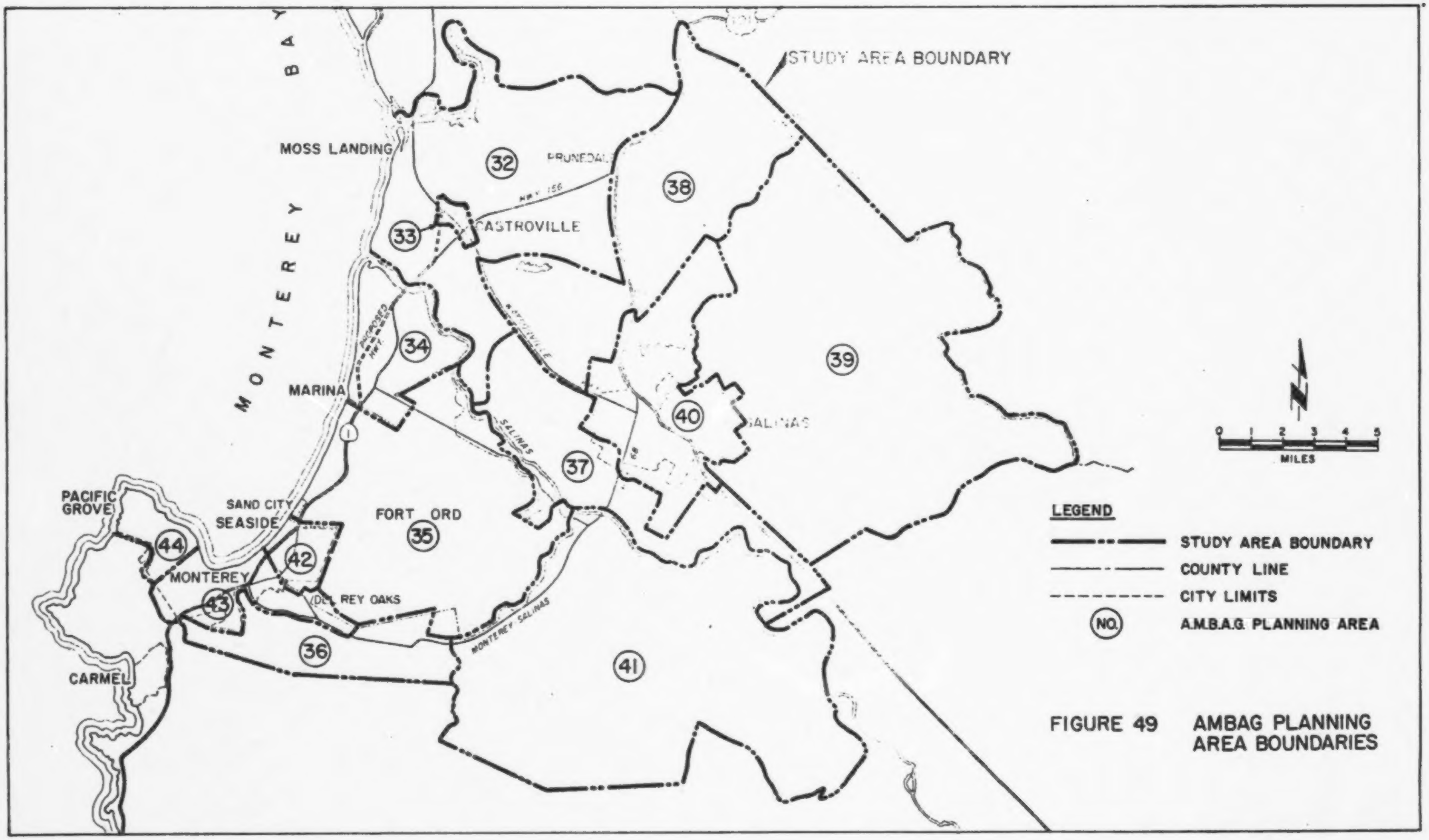
STUDY AREA BOUNDARY
MONTEREY BAY
MOSS LANDING
PRUNEDALE
HWY 156
CASTROVILLE
PROPOSED HWY 1
MARINA
1
CASTROVILLE
SALINAS
68
SALINAS
PACIFIC GROVE
SAND CITY
SEASIDE
FORT ORD
MONTEREY
DEL REY OAKS
MONTEREY SALINAS
CARMEL
32
33
34
35
36
37
38
39
40
41
42
43
44
0
1
2
3
4
5
MILES
LEGEND
STUDY AREA BOUNDARY
COUNTY LINE
CITY LIMITS
NO.
A.M.B.A.G. PLANNING AREA

FIGURE 49 AMBAG PLANNING AREA BOUNDARIES

Table 57

DRY WEATHER WASTEWATER FLOW PROJECTIONS

	Planning Area	Receiving Sewage Treatment Plant	Unit Coefficient			1980			1990			2000			Ultimate		
			Flow,(1) gpcd	BOD pcd	SS pcd	Flow, mgd	BOD lb/day	SS lb/day	Flow, mgd	BOD lb/day	SS lb/day	Flow, mgd	BOD lb/day	SS lb/day	Flow, mgd	BOD lb/day	SS lb/day
32	Castroville	Castroville	75	.17	.20	.15	340	400	.50	1,120	1,320	.82	1,870	2,200	1.13	2,540	2,990
		Salinas	90	.18	.28	0	0	0	.08	160	250	.14	270	420	.18	370	570
33	Castroville Sanitary District	Castroville	100	.20	.23	.43	860	990	.53	1,060	1,220	.59	1,180	1,360	.59	1,180	1,360
34	Marina	Marina	70	.14	.16	.92	1,830	2,100	1.21	2,420	2,770	1.54	3,080	3,520	1.54	3,080	3,520
35	Fort Ord	Fort Ord	-(2)	.17	.20	3.2	3,400	4,000	3.20	3,400	4,000	3.20	4,250	5,000	3.20	4,250	5,000
36	Monterey-Salinas	Seaside	90	.17	.20	.41	770	900	1.22	2,310	2,720	2.07	3,910	4,600	2.07	3,910	4,600
37	Salinas south	Salinas	90	.17	.20	.01	20	20	.01	20	20	.02	40	40	.02	40	40
38	San Juan	Castroville	75	.17	.20	0	0	0	.13	290	340	.15	300	420	.15	600	700
		Salinas	90	.18	.28	0	0	0	.14	290	450	.19	360	560	.43	630	930
39	Gabilan	Salinas	90	.17	.20	.01	20	20	.01	20	20	.02	40	40	.02	40	40
40	Salinas	Salinas	100(3)	.18	.28	7.86	14,100	22,010	10.18	78,265	28,500	11.35	20,365	31,800	20.00	35,885	55,990
41	Toro	Salinas	90	.17	.20	.49	920	1,080	.81	1,530	1,800	1.35	2,550	3,000	1.35	4,490	5,290
42	Seaside Sanitary District	Seaside	70	.17	.20	1.88	4,560	5,360	2.23	5,400	6,360	2.61	6,330	7,460	2.94	7,130	8,400
43	Monterey	Monterey	110	.21	.23	3.33	6,360	6,970	3.55	6,780	7,430	3.77	7,200	7,890	3.80	7,240	7,940
44	Pacific Grove	Monterey	75	.17	.20	1.47	3,330	3,920	1.61	3,660	4,300	1.65	3,740	4,400	1.69	3,830	4,500
	TOTAL					20.16	36,510	47,770	25.41	46,725	61,500	29.28	55,545	72,710	39.11	75,215	101,870

(1) Includes domestic, commercial, and collected industrial wastewaters on a per capita basis.

(2) Capacity of 3.2 mgd requested by Fort Ord

(3) Excludes the Salinas Industrial Waste Treatment Facility.

Source: Engineering Science, Inc., 1976a, Table III-7.